

AMERICAN FORESTRY

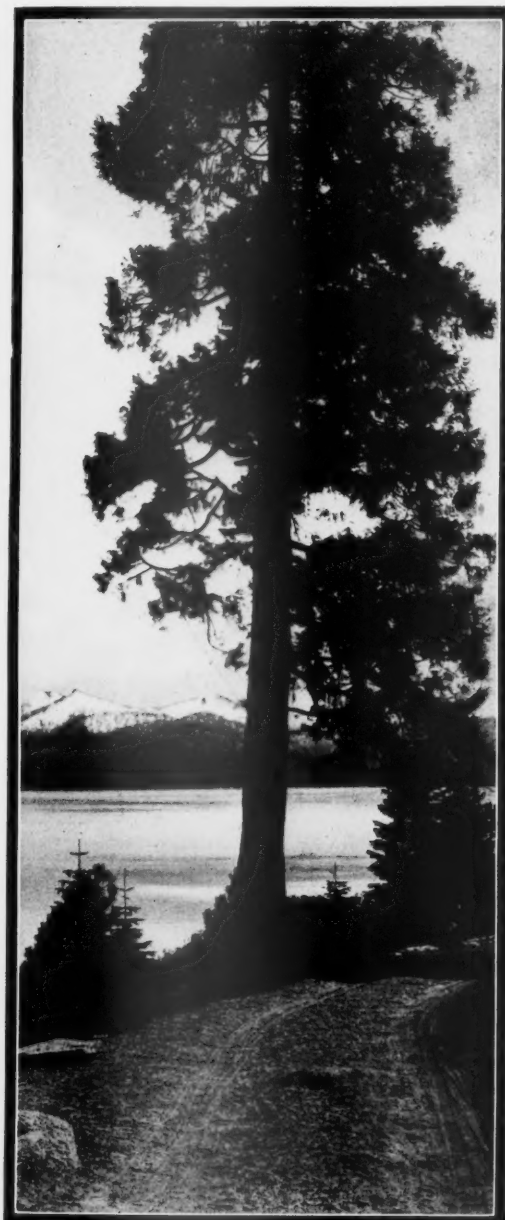
THE MAGAZINE OF THE AMERICAN FORESTRY ASSOCIATION

PERCIVAL SHELDON RIDSDALE, Editor

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A VIEW OF THE TOWN OF QUILLAN, EASTERN PYRENEES, WHICH MAJOR STUART DECLARES IS THE HOME OF THE BEST FRENCH COOKS AND OF A HIGH GRADE OF PATE DES FOIE GRAS (PAGE 1193)



THE ENTRANCE OF THE RIVER AUDE, NEAR QUILLAN, EASTERN PYRENEES, INTO THE GORGE WHICH IT HAS CARVED FOR ITSELF EN ROUTE TO THE SEA (PAGE 1193)

AMERICAN FORESTRY

VOL. XXV

JULY, 1919

NO. 307

FORESTERS AND LUMBERMEN HOME FROM FRANCE

BY MAJOR DAVID T. MASON, 20th ENGINEERS (FORESTRY)

AND

PERCIVAL SHELDON RIDSDALE, EDITOR OF AMERICAN FORESTRY MAGAZINE

PRACTICALLY all of the foresters and lumbermen sent to France as members of the Twentieth Engineers (Forestry) have returned home and been discharged from the service. They came back with the knowledge that they accomplished the job which was given them, that of supplying the United States Army with all the lumber and fuel wood it required, in a manner which won the admiration of all who know of the unceasing demands made upon them and of the difficulties which they had to overcome. They worked with the spirit which wins success and they return with an experience and a training which will greatly increase their ability and render them much more capable than they ever were before of doing whatever work is assigned to them.

The men who before the war were employed by the Forest Service will return to the Service in the same

or better positions, those who gave up jobs with lumber companies learn that their jobs or better ones are waiting for them, and men of other vocations who joined the forestry and lumber regiment will have no difficulty in obtaining work, for their two years' training in France has made them better men in every way.

The first of these forest and lumber troops arrived in France in October, 1917. The units comprised approximately twelve hundred men. By the end of the month the several detachments into which the regiment was divided were at work in forests in eastern, southwestern, northwestern and central France. During the long wait for the sawmill equipment there was much preliminary work to be done, such as establishing camps, building roads, cutting and decking logs. A number of small French mills were leased or bought to start lumber production. The other units began to arrive at their stations



MARITIME PINE LOGS BEING UNLOADED FROM NARROW GAUGE CARS INTO MILL POND IN PINE FORESTS IN SOUTHWESTERN FRANCE. AMERICAN 20-M MILL IN BACKGROUND

in France in December, 1918, and there was a steady flow of forest and lumber troops from America to France until by midsummer, 1918, there were about eighteen thousand Americans at work in the French forests. From the small amount of timber produced at first the output increased rapidly until for the month of September, 1918, it consisted of forty-two million feet of sawn material, including four hundred forty thousand railway ties, of thirty-six hundred pieces of piling mostly over fifty feet long, of five hundred sixty thousand poles and of thirty-eight thousand cords of fuel. By this time there were eighty-one American sawmills at work. But

able record in lumber production. At Pontenx, a lumber camp near Bordeaux, a set of curves showed graphically just what each shift at each mill accomplished each day; each shift and each mill was trying for the high record, and the palm often changed hands. High monthly records were more prized than high daily records. To keep up the interest between districts in which the lumberjacks were working, the central office of the regiment at Tours sent out each month the records for each of the eighty-one American mills finally operating in France.

The best single day record is that of the twenty-M



INTERIOR OF AN AMERICAN SAW MILL IN FRANCE, SHOWING ONE OF THE LOG CARRIERS WHICH THE FRENCH CHILDREN NEVER TIRED OF WATCHING

still the prospective timber demands of the ever increasing American Army were not fully assured, and when the armistice brought fighting to an end in November work was well under way in the United States to more than double the number of forestry troops in France, and units amounting to twenty-four thousand men were being organized.

Americans never work so happily and effectively as when they make a game of the job and compete with some one else or some other group doing the same sort of work. This characteristic helped win the war by driving more rivets and building ships faster than such work had been done before; it helped in France building warehouses, unloading vessels and in reducing salients; it was a valuable asset in the forest operations of the Twentieth Engineers (Forestry), which made a remark-

mill at Levier in the Vosges. This mill, which had been overhauled and improved somewhat, cut 163,000 feet in twenty-four hours. The many other good records made by American mills in other parts of France, as well as the many different types of forest encountered and the different methods of operation will make the history of the Twentieth Engineers an exceedingly interesting one.

Before the work of the lumber regiment was well under way in the Landes a few small political clouds appeared momentarily in the sky. Timber was being acquired rapidly, but under the policy that not more than one year's cut would be bought ahead of any single mill; the delay in the arrival of equipment made it look for a time as though the regiment would fall far behind the program; some of the French were skeptical of the abil-



A LARGE LOAD OF MARITIME PINE LOGS ON AN AMERICAN MOTOR TRUCK IN SOUTHWESTERN FRANCE

ity of the mills to cut even as much as the rated capacity. Peasants dependent upon the resin industry were frightened for fear that the Americans would destroy their means of livelihood by cutting too much timber. Timber merchants who hoped to sell timber to the Americans at fabulous prices were having their toes pinched by that effective steam roller—the requisition—which took the timber required at a reasonable price fixed by the French forest officers. Complaints were heard in the French Chamber of Deputies (corresponding to the Congress of

the United States). The officers of the regiment were reminded of the early days of the Forest Service in America, when certain senators and congressmen were accustomed to make the most wild and ridiculous statements in the halls of Congress about the work of the Forest Service. Among the alleged acts of the Americans were the devastating of enormous areas of timber land by unrestricted cutting, the clearing of camp sites by the use of fire which escaped and ran for miles, and other equally indefensible acts. One of the chief mourn-



20th REGIMENT MEN TRANSPORTING LOGS, BY MEANS OF "BIG WHEELS," TO THE BANK OF THE COURANT RIVER, AUREILHAN OPERATION, NEAR PONTENX, LANDES, FRANCE

ers was a timber merchant from Landes. The Minister of Agriculture agreed to send his Inspector General of Forests to look into the troubles.

The Inspector General and a party of French forest officers arrived at Pontenx to visit the American operations. They went over the ground carefully, but found no evidences of ruthless devastation. They found that fire had been carefully controlled, that the methods of cutting the forest followed absolutely those employed by the French. They were much interested in the work of driving the Courant River, and especially in the scheme

camp; the kitchen was reached just in time to see the cook take a big batch of fine brown cookies from the oven; the hot cookies were greatly enjoyed, for such things were then forbidden in French civil life. A loaf of white bread, practically unknown in France for three years, was given to the Inspector General; this was a most acceptable gift and was very pleasantly received. After this visit no more complaints of American methods were heard.

The French sawmills, several of which were leased or bought for American use during the first few months



CANAL AND CAR BRINGING LOGS UP TO THE HOIST INTO THE AUREILHAN MILL OF THE 20th ENGINEERS NEAR PONTENX, LANDES, FRANCE

of drying out the trees in advance, for apparently the practice of driving loose logs was unknown in the streams of France. The larger mills were cutting at a rate astonishing to the French, for they were even greatly exceeding the regiment's own expectations. The mechanical ingenuity, the power, and the rapidity with which logs were reduced to lumber was admired by the French. They shrugged their shoulders, however, at the thick circular saws, for it gave them real pain to see so much of their precious wood going into sawdust; a few moments, later, fortunately, their faces brightened when they saw the sawdust automatically fed into the "dutch ovens" as fuel, for the French are accustomed to drive their sawmills by power secured from the valuable slabs and edgings while the sawdust is generally a total loss. A little later the party was shown through one of our

after the regiment reached France, were objects of considerable curiosity to Americans. Although a few of these mills are housed in permanent brick buildings in connection with turpentine stills, the typical mill of the region was a very portable affair readily moved about from one small cutting area to another. Usually the main saw, which is frequently the only saw, is a very thin, narrow band saw; sometimes a thin circular saw is used instead. The short logs, ten feet or less in length, are placed by hand on the light saw carriage; a crank turned by hand feeds the log against the saw. The lumber is edged on a very small, light carriage, which runs past the opposite side of the band saw from that on which the log is sawn; the board is held down on the edger carriage by a hook at one end and by the hand of the operator at the other. Generally no trimming is

done. One of the mill hands carries the sawdust away in a basket. The mill is operated by a ten or twelve horse power engine. Ordinarily about four people are employed at such a mill, and they produce from two to three thousand feet of lumber per day. Many of the workers are women. In the woods, the logs are usually cut in lengths less than ten feet long to facilitate handling them at the mill and loading them upon the two-wheel carts which haul them to the mill. The logs are peeled in the woods and are given a chance to dry out to some extent; this lightens the logs for handling and also makes sawing easier.

An American notes at once the close utilization of the timber and the large amount of human rather than mechanical labor used in French operations. The very high

which can be worked hard and forced to yield a large daily production; and these were days when a big output was wanted, even at the cost of some raw material.

The first American mill to operate in the Landes was a ten-M mill which started sawing lumber at the Bellevue camp on the last day of 1917. In addition to the head saw, this mill was equipped with edger and trim saws; there was a blower to remove the sawdust. When this mill caught its stride it cut an average of twenty-seven thousand feet of lumber in the two ten-hour shifts. Its record cut was thirty-nine thousand seven hundred feet in one twenty-hour day. One night an accident to the engine stopped the mill; fortunately there was available a French engine with just about enough power to operate the head saw; this engine was placed at the end of the



MARITIME PINE LOGS DECKED AT A 20-M AMERICAN MILL IN THE SAND DUNE COUNTRY OF SOUTHWESTERN FRANCE

timber values and the low labor costs account for this situation. Just before the war, the French forest laborer, if a man, received from sixty cents to a dollar twenty cents, depending upon his skill, for ten to eleven hours' work per day; he lived at home and furnished his own food. The rate of pay for women was much lower. During the war a muleteer was locally considered a "veritable millionaire;" he demanded three dollars and a half for a day's work for himself, his team of mules and cart, whereas before he had received only half as much.

The sawmills manufactured in the United States and sent to France for the use of the forest troops were in three standard sizes; the bolter mill for small, short logs had a capacity of five thousand feet of lumber in ten hours; the "ten-M" mill had a rated capacity of ten thousand feet in ten hours; and the "twenty-M" mill was designed to cut twenty thousand feet in a ten hour shift. All of these mills used circular saws, which cut a far heavier saw curf than the French mills; it is characteristic of Americans to use strong, heavy machinery

mill, the belt was run across the log deck to the driving pulley of the head saw, and the mill went merrily on for several days, until the regular engine was repaired, cutting and edging eighteen thousand feet of lumber per day on the head saw. When this mill finally ran out of timber, the orders were to move it to a tract of timber at Sabres, a place twenty-five miles away; it was considered that five days was a reasonable time within which to make the move; but by careful planning and organization, this mill was sawing lumber once more at Sabres forty-seven hours after the sawdust stopped flying at Bellevue.

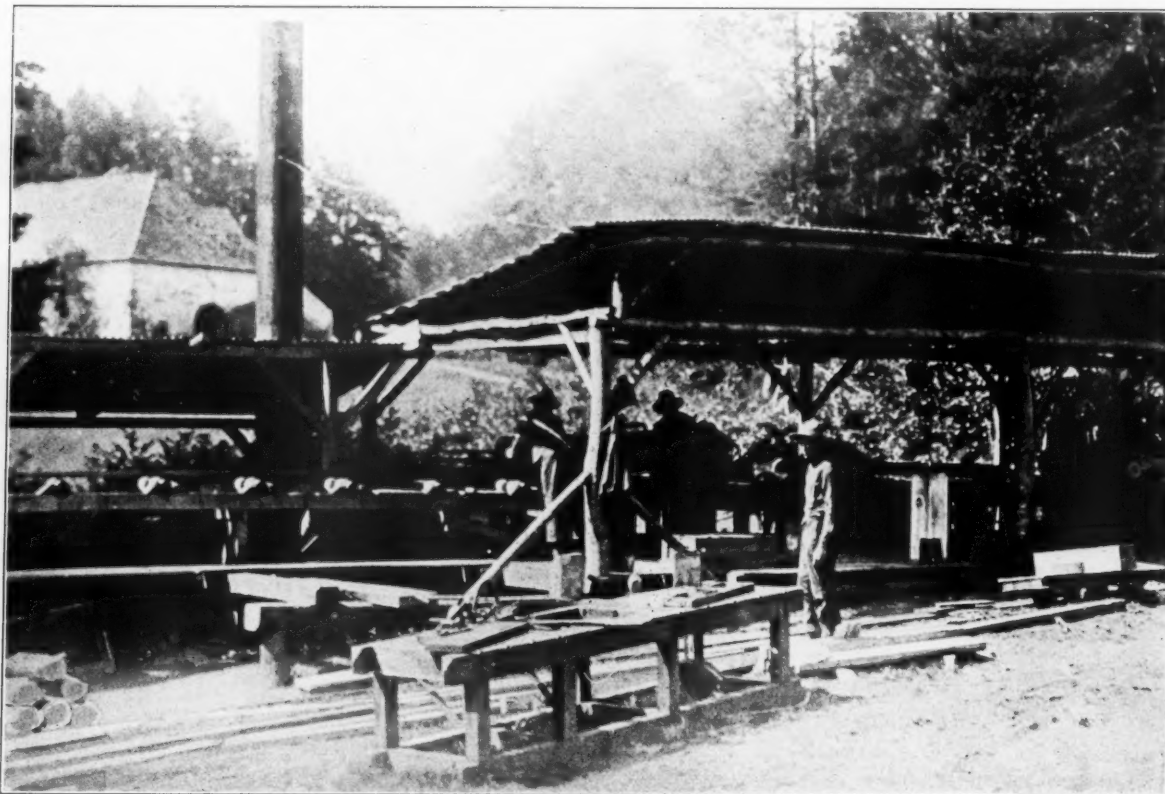
The parts for the twenty-M mills arrived more slowly and it took more time to build them than in the case of the smaller mills. The twenty-M mill at Labroquette, near Pontenx, was the first in its class to operate in France. Two other mills of this size at Bourricos and Aureilhan completed the Pontenx group of mills. April 1, 1918, was the first day upon which all four of the mills of the district operated double shift; on that day

they cut one hundred sixty thousand feet of lumber.

The Aureilhan operation was, on account of the variety of methods involved, perhaps the most interesting of any which Americans conducted in the Landes. The timber tributary to this mill lay partly in the sand dunes near the coast and partly on flat, sandy ground further inland. After the timber was felled and cut into logs, much of it was moved by big wheels, bummers or trucks direct to the Courant River; the more remote dune timber was delivered to a narrow gauge railway, upon which horse-drawn cars transported the logs to the river. The logs were then driven down the river for

Aureilhan Lake is a pretty little sheet of water five or six square miles in area. It was formed only a few generations ago when the sand dunes blocked the river channel. It is said that the ancient village of Aureilhan was buried in the lake. The Aureilhan mill was set near the edge of the lake, and a small canal was dug to bring the logs to the mill during the low water stage. The mill was connected with the French railway system by a spur about a half mile long. Immediately after it was sawed most of the product of the mill was placed in cars for shipment.

The Bourricos mill, to which the logs were delivered



A TIE MILL OF THE 20th ENGINEERS

about four miles, caught in a boom at the point where the river flows into Aureilhan Lake, and towed across the lake to the mill. The maritime pine is so pitchy, sappy and heavy that there was some doubt at first as to whether the logs would float; a few logs tested showed that they would float, but they rode so low in the water that special measures were taken to reduce the weight; several months before the logs were needed at the mill, the trees were felled and left for some time with their branches attached; the leaves continued to function, and so drew much of the water out of the stems of the trees. The stream driving had to be very carefully handled, for with the loose sand bottom and banks there was considerable danger that if jams were formed the water running past would scour out large amounts of sand and form shallows below.

by a narrow gauge logging railway, was set so near the French railway that only a short loading spur was needed. In the case of the Bellevue and Labroquette mills, however, it was necessary to build about four miles of narrow gauge railway to deliver their product at the Pontenx shipping yard, where it was loaded upon the broad gauge cars for final shipment. This narrow gauge line ran along the main street of Pontenx; the villagers no doubt cursed it many times, for it was operated day and night to keep the mill yards clear, and the trainmen took fiendish delight in blowing the whistle of the dinky locomotive when most people wanted to sleep. At one time for several days, while the locomotive was broken down, motor trucks were used to tow the trains of lumber in from the mills.

During the early stages of the Pontenx operations

there was such difficulty in getting cars in which to ship the product that a considerable amount of storage space seemed necessary; the Pontenx shipping yard was therefore laid out with a capacity of about three million feet of lumber. Although about a million feet did accumulate in the yard soon after the large mills began to operate, a more plentiful supply of main line cars soon reduced the stock. No attempt was made to grade, dry or surface the product; the market was all that an American lumberman could imagine in his rosier dreams; the army wanted more than could be supplied. The shipments from Pontenx consisted principally of sawn railway ties, road plank, lumber, piling, and fuel wood. In the Pontenx yard, a loading crane was constructed which did effective work in lifting fifteen hundred to two thousand feet of lumber or timber from the narrow gauge direct into the main line cars. The French freight car of standard size holds ten tons, or about five thousand feet of the green maritime pine lumber; this is only about one-fifth of the amount of lumber ordinarily loaded in an American freight car.

At one time while railway cars were still scarce, a fleet of more than one hundred motor trucks was assigned to the work of hauling lumber from the mills in the Landes to a point near Bordeaux; a three-ton truck would do the work of a standard freight car, for whereas the motor truck made a one hundred or a one hundred twenty mile round trip in a day the freight car would take several days to deliver its load near Bordeaux and to return to Pontenx.

The branch line railway upon which the Pontenx and Mimizan groups of operations were located served eight

American mills distributed from eight to thirty miles from its junction with the main line railway through the Landes. The American traffic on the branch line, which grew to seventy or eighty cars of lumber and other forest products per day, soon greatly exceeded the French use of the line. Several rather antiquated locomotives were hired from the French, and American train crews handled the American products as far as the main line junction point.

One of the serious problems of the Pontenx operation was the disposal of the great quantities of slabs and edgings which rapidly accumulated at the mills. In France no one would think of sending such material to be burned on a refuse pile, as is so commonly done in America. The army needed enormous amounts of fuel; the problem was not that of finding a market, but of securing labor to handle the material and cars in which to make shipments. A blast furnace and iron foundry, which had been in operation for one hundred twenty years at Pontenx, was working at capacity to produce shells for the Allied armies. This plant needed a lot of charcoal and wood, much of which it was shipping in by rail for considerable distances. A satisfactory deal was arranged with this company, under the terms of which the Americans obtained a splendid tract of standing timber, and the munitions company received all of the fuel wood in tops and branches remaining from the logging operations, and all of the slabs and edgings not needed for local consumption. The company furnished all of the labor to handle the material, part of which was made into charcoal before it was hauled to the munitions plant.

SCOUTING FOR TIMBER IN THE EASTERN PYRENEES

BY MAJOR R. Y. STUART, 20th ENGINEERS (FORESTRY)

THE general American impression of French forests is that they are like American parks in appearance and that their products are so readily accessible for transportation and utilization as to give value to the smallest twig. This idea is not unfounded since in most parts of France these conditions are representative. One is apt particularly to reach this conclusion if he does not leave the usual course in rail and road travel. But there are parts of the country, devoted to tree growth, which are less accessible and sustained a greater shake up in formation than those more usually seen by the tourist. Units of the 20th Engineers operated in parts of the Vosges, Jura and Central Plateau that brought to their minds vivid memories of overhead skidders and donkey engines employed on their last jobs in the States, methods which permit ready handling of the products and large outputs but not recognized in France as suitable companions for forest protection.

As the demand for timber among the Allies increased it became necessary to investigate the situation in every part of the country regardless of the question of accessibility,

which, it must be conceded, is a relative factor. Lacking boats and other transportation to bring timber to France every available tract became a prospective operating chance. Tracts which previously had been passed up as too inaccessible or difficult to exploit loomed large as possibilities within which to place a mill and crew. Any job that was practicable from an operating standpoint was booked for a coming forestry engagement. Opportunities of their kind were not lacking in that the Americans having been late comers and bearing a reputation for tackling difficult industrial problems brought up for consideration as logging chances tracts which were accumulating surplus growing stock on account of their relative inaccessibility.

It had been determined by preliminary inquiry and investigation that there were some excellent stands of timber in the Pyrenees, the Aude and Tarn, and the Alps regions, but their general location in relation to the points of use made them unattractive so long as the mills and men available could be kept engaged in more accessible operating centers. The rate at which the Americans



QUILLAN, AUDE, IN THE EASTERN PYRENEES. THIS IS A GENERAL VIEW OF THE TOWN AND THE TIMBER DENUED HILLS NEAR IT. THERE IS, HOWEVER, A LARGE SUPPLY OF GOOD TIMBER A SHORT DISTANCE FROM THE TOWN

landed and added to the already large demand for timber in the summer of 1917 necessitated further and more careful consideration of these and other outlying regions as operating points. Accordingly, arrangements were made to scout for prospects throughout all of the Southern Departments. To Captain P. A. Wilson, an experienced British Columbia logger and mill man, and the writer was assigned the mission of covering the Departments adjoining the Mediterranean from Toulouse, east to the Italian line.

The most interesting prospect reported was on the Espezel Plateau, near Quillan, Aude. Captain R. C. Hall had been in that section in the early spring on a preliminary reconnaissance from which it had been determined that the question was not whether the timber was there but rather whether it could be gotten out. Quillan is snugly situated on either bank of the Aude River, a short distance from its entrance into the gorge which it had carved for itself en route to the sea. From the town, surrounded by massive ranges, the timber situation did not look promising, but we were assured by the townsfolk that the prospect lay on the plateau above Quillan.

A climb of 1,500 feet in 7 miles with an average grade of 4 per cent and numerous hairpin turns did not brighten our hopes of making a find. From the edge of the plateau one secured a general view of the timber possibilities. Bounding the Espezel Valley were extensive ranges well timbered and apparently directly accessible from the valley floor. Our automobile indicator registered 22 kilometers (14 miles) from Quillan, the nearest railroad point, where we reached the most accessible

range. While the climb to the plateau and the distance to the shipping point continued to loom large in our calculations they were discounted somewhat when we gave attention to the timber itself. Others had also been impressed with the seriousness of the transportation factor for in no other way could one account for the retention of such fine stands in France. On the ranges encircling the plateau were exceptionally fine bodies of fir suitable in size and quality for the various war demands, including large products such as piling and structural timbers, so difficult to secure. We learned from the French foresters that a cut of approximately 194,000 cubic meters (48,500,000 feet B. M.) could be secured from the State Forests in the group in strict conformance with the customary French cutting methods. This cut represents roughly the yield from these forests for four years. To an American forester in Army khaki visiting them after the spring drive of the Boche it appeared that a cut of twice the amount estimated would leave the forests well prepared to supply timber against the needs from future Boche onslaughts.

The trees were well cleared and symmetrical, ranging from 12 to 36 inches in diameter, from 100 to 300 years in age, and from 80 to 125 feet in height. We observed some areas which would cut 60,000 feet B. M. to the acre. One veteran of at least 48 inches in diameter and 135 feet in height was gaudily marked with a wide band of red paint, a mark of respect to his age and size. The Forest Brigadier expected all visitors in the region to go and see it. Some fungus and unutilized windfall, which are uncommon in French forests, were observed. Logging conditions were variable, the surface varying from

gentle and rock-free to boulder strewn and, in cases, precipitous slopes. As a whole it was, as Captain Wilson expressed it "Some logging chance."

We were convinced that the timber was there but the question of how to get it out was unanswered. That this could be done, and profitably, was evidenced by the fact that Spanish civilian contractors were hauling out four cubic meter (1,000 feet B. M.) loads of logs per trip to Quillan, from 20 to 35 kilometers (13 to 22 miles) distant, at from 25 to 35 francs per cubic meter. An average of two trips in three days was made, giving a return of approximately \$28 per M feet B. M., or \$19 a day. A pair of stout oxen, a heavy two-wheeled French

the logs from stump to mill. A railroad was dismissed because of the heavy and expensive rock work entailed in reaching the plateau with consequent extended period of time for completion. The established road bed was too narrow and tortuous to permit a narrow gauge installation. There was no favorable location for an incline, such an artificial arrangement not having been provided for by nature in forming the topography. A cable, well installed, would work to advantage if cable were available, but cable was as scarce in France as bon-bons. So it narrowed down to a horse job for the woods and motor trucks for the haul to the railroad point, with the oxen and two-wheeled carts as a reserve. The disappointment of the writer is



SO NARROW IS THE GORGE THROUGH WHICH FLOWS THE RIVER AUDE, NEAR QUILLAN, IN THE EASTERN PYRENEES, THAT THE ROAD HAD TO BE TUNNELLED THROUGH THE ROCK

cart and plenty of "vin rouge" in a goat skin sack constituted the transportation equipment. At first blush the method seemed antiquated and inefficient but after observing the manœuvring of animals and loads through and over almost impassable places for stock one was forced to the Ford conclusion that "it takes you there and gets you back." My belief was that, all factors, including cutting restrictions, considered, a copious supply of oxen, two wheeled carts, "vin rouge" and select Spanish woods phrases would be the most economical transportation method for the operation.

The American mind naturally turns to machinery to assist in meeting engineering problems and the examiners in this instance were not exceptions. Railroad, incline and cable were all considered as a means of transporting

that he could not have seen the competition which would have ensued between the Spanish and American contestants for the road and capacity loads.

The next prospect for investigation was some fir timber on the State Forests of Hares and Carcanet, about 20 miles above Axat on the Aude River. One follows the gorge previously mentioned in reaching these forests from Quillan and is more impressed with the attractiveness of the country to the tourist in search of rushing streams and precipitous slopes than to the timberman in search of a mill prospect. Our earlier experience, however, had taught us to reserve our decision until we were actually within the forest.

The Hares and Carcanet were not so desirable as the forests in the Quillan group, but to those in need of

timber they offered the opportunity of securing excellent material. The French foresters estimated that under their customary methods of marking for the type a cut of 86,000 M³ (34,000,000 feet, B. M.) would be secured, representing in this instance a cut of 90 M³ per hectare (9,000 feet, B. M., per acre). The average tree approximated 20 inches in diameter and 70 feet in height, and of lower quality than at Quillan. Defect was more noticeable. The surface was exceedingly rough and uniformly steep, which, with a lack of substantial forest roads, made the forests very questionable for operating except under war conditions. Some patient and thrifty Frenchmen were engaged in hauling logs from the vicin-

growth. If his offer was in good faith he merits the sympathy of his countrymen; if made in bad faith he has since learned that the buying of timber by the A. E. F. was not wholly a paper transaction.

We learned of a tract of mountain pine near Mont Louis, Pyrenees Orientales, reported to contain from 80,000 M³ to 100,000 M³. Our trip to the tract from Axat was not without interest in that we picked up two French gendarmes en route to the nearest telephone, 12 miles, to report the escape of two Boche prisoners, who, presumably with a Spanish confederate, were headed for the border. It may be remarked that even under the favorable chances for concealment in the mountains of



ANOTHER VIEW OF THE TERRITORY AROUND QUILLAN, IN THE EASTERN PYRENEES. THE TIMBER IS MOSTLY ON THE HIGH PLATEAU NEAR THE CITY

ity to Axat with oxen, making two trips a week. The plan of operation outlined for the A. E. F. was to skid and haul the logs by carts to the main road where the logs would be loaded on the tractors or trucks for the haul down the canyon to the proposed mill site at Axat.

An amusing, yet provoking, incident in connection with our timber examinations near Axat was an offer for sale of 3,000,000 M³ (750,000,000 feet, B. M.) by an enterprising American who apparently wanted to do his country a bit. His claim of title covered a scope of country worthy of a favored nobleman. Vigorous mountain climbing and the use of field glasses revealed the fact that the only merchantable timber within the area defined was that on the forest of Hares and Carcanet, title to which had passed to the State 20 years ago. The remaining area was mountain tops, gorges and slopes with scrub

that region the odds are strongly against the Boche having escaped the vigilant gendarmes.

The timber department of the French Army (Centre de Bois), had already secured a liberal cession of the mountain pine and were engaged in operating it when we reached there. We were informed of a controversy which had arisen out of the cession, the Commune and the National Forest Service (Department des Eaux et Forêts) disagreeing on the extent to which cutting on the forest, which was Communal, should be permitted. The Commune insisted that the timber be clear cut so that the land could be devoted to agricultural use. The Forest Service was equally insistent upon conservative cutting and the retention of the land for timber production on the ground that the balance between agricultural and timber land in the region should not be disturbed. The

latter, supported by higher authority, won out.

Believing that the Quillan, Hares and Carcanet tracts would afford a sufficient opening for Pacific Coast loggers to establish European reputations and put them in shape to exhaust the further possibilities of the region, we went in search of hardwoods to appease the woods appetite of our Eastern and Southern logging contingents. An offer of some beech and oak from the State forests of Cayroulet, Hautaniboul and Ramondens had been received which looked very promising as tie prospects. These forests form the greater part of Montagne Noire on the boundary between the Departments of Aude and Tarn. The old city of Carcassonne with its massive walls and towers is the historic landmark of the region. The "cite"

was to clear cut but the French were unwilling to practice this method further until the results of experiments under way were known. About 10 years ago clean cutting on limited areas had been made and fir planted, on the ground that the value of fir in the region was greater than beech and oak. The plantations were thriving, giving every promise of success.

The stands varied in size considerably under the system of management followed, which provided for periodic fellings whereby succeeding age classes were thinned and developed to maturity serving in turn as a nurse to succeeding stands. The fight against the encroachment of holly was waged by requiring each timber operator to grub out the holly on the area from which he purchased



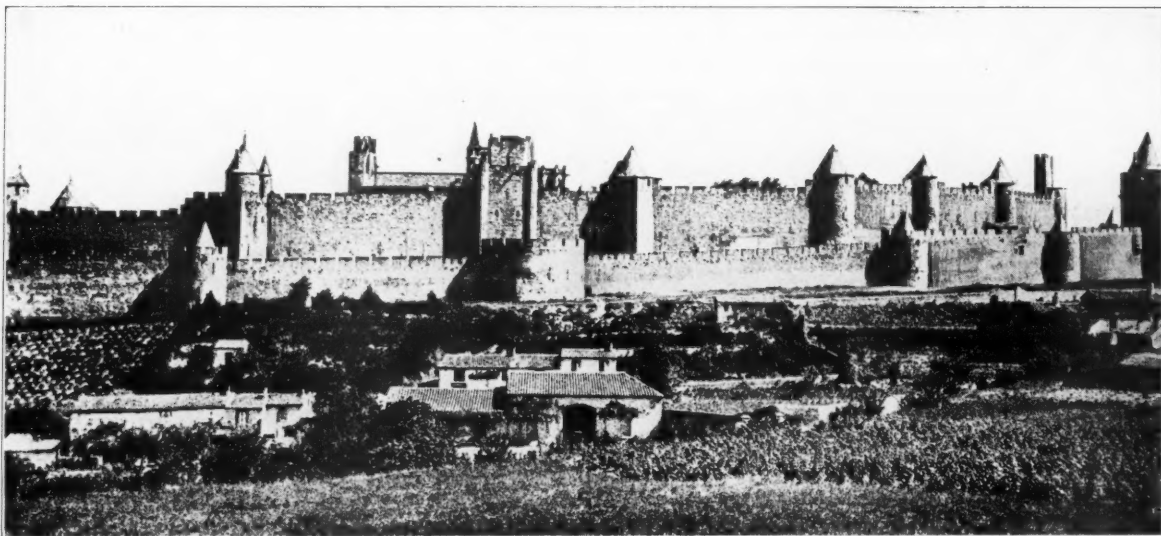
A WILD BOAR (SANGLIER) HUNTING PARTY NEAR QUILLAN, IN THE EASTERN PYRENEES. THE WRITER OF THIS ARTICLE, MAJOR R. Y. STUART, 20th ENGINEERS (FORESTRY) STANDS ON THE EXTREME LEFT

and Montagne Noire attract many tourists in normal times; the former at the time of our visit was a confinement camp for some German officials.

The demand for ties on the part of the Allies seemed insatiable, and for this purpose hardwoods were eagerly sought. Normally one would secure ties, of pine if necessary, from more accessible areas than Montagne Noire, but under pressure of war demand the Montagne Noire prospect looked exceedingly good. Eliminating portions of the forest which presented transportation problems incommensurate with the quantity of timber to be secured a cut of 18,000 M³ (4,500,000 feet, B. M.) was assured under the French system of marking. While a much heavier cut without injury to the forests seemed possible it was explained by the foresters that the encroachment of holly in the openings would follow a more severe cutting. The alternative to secure a heavier cut

the timber. Had the A. E. F. operated on these forests it would have been necessary for it to expend the time of 100 men for 30 days on this work or compensate the French Forest Service 30,000 francs for having the work done. With such care it is small wonder that beech 2 feet in diameter with a clear length of 40 feet and without defect was being produced.

It proved unnecessary to begin operating in any of these regions, the summer drives of the Boche having developed into a boomerang by early fall, terminating in the procurement of a supply of timber to meet the needs of the Army of Occupation from German forests and a freer movement throughout France of material already produced. By December 1, the stage was reached where mills were being dismantled and arrangements made to wind up our timber affairs. Many of the men who, under



THE OLD CITY OF CARCASSONNE, WITH ITS MASSIVE WALLS AND TOWERS, IS THE HISTORIC LANDMARK OF THE REGION NEAR QUILLAN. WHEN THE WRITER WAS THERE IT WAS USED AS A CONFINEMENT CAMP FOR SOME GERMAN OFFICIALS

other circumstances, might be shouting at oxen yoked to two-wheeled carts on the Quillan grade or grubbing holly on the Montagne Noire are seeing the picturesque Pyre-

nees and the historic old city of Carcassonne on leave of absence. It may be that some of them are in citizens clothes in the States.

TRANSPLANTING LARGE TREES

LARGE trees are always transplanted with considerable difficulty and expense, and are far less likely to survive the operation than smaller ones. If trees above three inches in diameter are to be moved, it is best to have the work done by some one who has had experience in transplanting large trees. The most successful results are accomplished by means of a tree-moving machine. Such machines are made by at least two firms in the United States viz., John A. Wilkins, Indianapolis, Indiana, and Isaac Hicks & Son, Westbury, New York. With these machines, trees having a diameter as great as twelve inches can be safely moved.

To those who may wish to attempt the transplanting of trees without engaging the services of an expert, the following suggestions are offered:

In the fall, before the ground freezes, a trench should be dug around the tree which is to be moved, and as deep as the roots have taken hold on the soil, usually three to four feet, leaving a ball of earth from three to seven feet in diameter, depending on the size of the tree and the development of the root system. At the same time a hole should be dug where the tree is to be planted, making it deep enough so that the tree when planted will stand three to four inches below its original level, and large enough to allow the filling in of one to two feet of good rich soil about the roots after the tree is placed in position. To prevent freezing, both the hole and the earth dug from it should be covered with straw.

When the ball of earth has frozen the tree is ready to be moved. The smaller trees may be moved by rolling the ball of earth on a sledge or stone boat, the stem being supported upright to prevent injury to the limbs,

in which position it may be drawn to the place of planting. The ball of earth on larger trees should be raised to the surface by repeatedly leaning the tree to one side and filling in under it with earth on the other. The crown of the tree should then be lowered to the ground and the ball rolled on a long sledge or stone boat by the aid of horses. The trunk should be held free from the ground by means of wooden horses or supports placed on the rear of the conveyance. The limbs should be tied up to prevent injury in transportation. In all these operations plenty of burlap or other material should be used to prevent damage to the bark. Horses may again be used to roll the ball into final position and raise the stem upright.

In all cases the soil should be firmly packed about the roots of the transplanted tree. To prevent their being thrown by the wind, the larger trees should be supported by three or four guy ropes, which should not be removed until the tree has become firmly rooted in its new site.

It is very important that trees transplanted in this way should be watered during periods of drought for the first two or three years, or until the equilibrium between the root and branch systems, disturbed by the transplanting, has been restored.

An experienced tree-mover states that of all our trees, the elms are most likely to survive when moved at a mature age. Other trees which may be more or less successfully transplanted are the maple, horse chestnut, catalpa, ash, linden, willow, poplar, and pin oak. Trees grown in the open are much better to move than those grown in the woods, and a large young tree is more likely to succeed than an old one of the same size.

CANADIAN FORESTRY CORPS WORK IN FRANCE

BY ROLAND HILL

(Canadian War Correspondent)

OF THE many experiences in quaint places in which the Canadians found themselves doing war duty those of the Canadian Forestry Corps can claim almost prior place. In 1917 Britain, France and Italy were all appealing for lumber—and more lumber. The Allied forces in Salonika were crying for it in the worst kind of way. Russia offered a supply if cutting could be organized. So into the four corners of Allied Europe were sent Canadian timber cruisers, men who had foraged through Northern Quebec, Ontario and British Columbia. Some of them could speak no language but their own, but they knew what they were after, and they could tell to the thousand how many billion feet could be cut from a forest. At one time, after three Ontario men had cruised Crete and Mudros, a Canadian mill outfit was started on its way to the picturesque Mediterranean. But the Royal Engineers decided to do the job and the Canadians were robbed of one of their quaint experiences. Parties were sent to Russia and were about

to start operations when the distant rumbles of the revolution were heard and they were withdrawn.

The best record of the Canadian Forestry Corps, outside that done for the British was the supplying of every class of lumber direct to the French Armies from the Vosges and Jura Mountains on the Swiss border and from the Landes and the Gironde, south of Bordeaux, in sight of the Pyrenees. In the north Canadian uniforms came to be known in the quaint mountain villages, and the peasants opened their homes to the strange men from across the Atlantic. Down in the Landes, where reigned a "dolce far niente" almost Spanish, the vigor and expedition of the Canadian wood choppers was an unceasing marvel. Some of the Canadians from Acadia found distant relations of the same names through Cabot and Cartier in the mountaineers of the Jura.

One day in the early spring of 1917, two Canadian officers chatting with the engineer of the Paris-Switzer-



CANADIAN ROADMEN KEEP THE FOREST TRAFFIC WAYS IN GOOD CONDITION

land express told of the big engines that drove the Canadian Pacific trains over the big grades of the Canadian Rockies. They were critical of the toy French engines. They were invited to take the trip over the border into Pontlarlier, the sentinel town of the international border. On they climbed, and when the end of the run was reached, two begrimed, but happy beings climbed off the engine honorary members of the French Railwaymen's Union. One man worked the engine up the winding grades and the other had stoked. One was a professor of Mechanics at McGill University, and the other was chief engineer for one of the biggest lumber companies in Ontario. That was the kind of material of which the Forestry Corps was made.

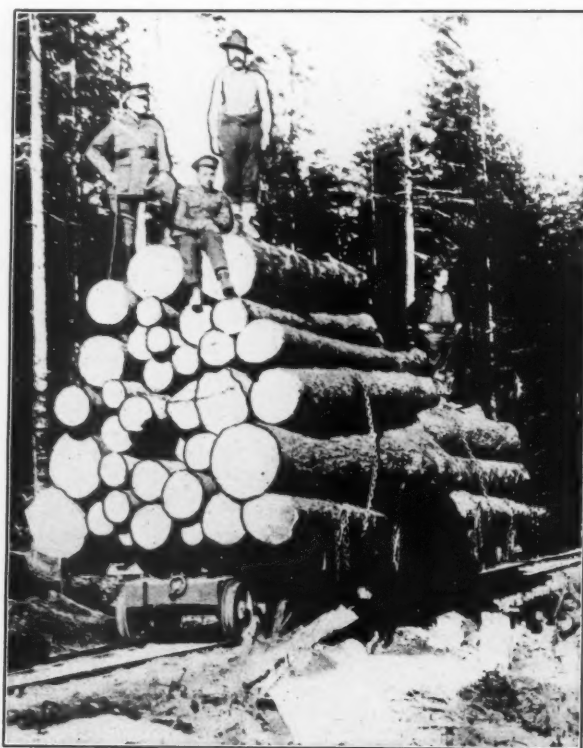
When the timber famine came along the fighting fronts of Europe, the extreme east of the French lines and fortresses like Belfort were pleading as urgently as the rest. There were huge forests but no material or men to cut them fast enough for military needs. Heavy timber meant the saving of Frenchmen's lives, so a bargain was struck that treble the amount cut and delivered by the Canadians in the Vosges and Jura, for the French armies would be delivered in standing timber near the British lines. In two weeks boilers and mills from the far away Dominion were installed in the mountains. The railway officials were their friends, and loading sidings were blasted out of the solid rock cuttings through the mountains. The peasants, who formerly cut the big trees, used to slowly bring them down the mountain roads by ox teams into the valley town where there were ancient mills driven by water wheels. Ten trees a day was a good average for the mill to saw.

Then the Canadians came on the scene. There were many engineering difficulties to overcome. The supply of water for the big Nova Scotia boilers was solved by their own men and miles of piping were laid that defied gravity by artful pumping. Light railways were built through the forests and mud roads were macadamized by mountain rock which was crushed by our own outfits. In the various mills at the end of the war the output of all sizes of timber had reached 400,000 feet daily, more than the whole Jura produced in the year before hostilities broke out. Fifteen or twenty mills of Canadian type

were distributed at strategic points—anyone coming on the scene might have thought themselves to be in Northern Ontario, or British Columbia. The clever engineers of the Forestry Corps were always willing to help the villagers. They showed them how to harness the rushing streams that irrigated the vine-clad slopes, and turn them into power for electric light or to run their wine presses. One Canadian major who had been in the wooden pipe business on the Pacific Coast gave up his trade secrets in the fraternity of war-time, and water systems were started in villages that for centuries had dipped buckets in the communal stream.

In the south of France the huge pine forests which Napoleon planted for the peasants yield them fortunes

in resin and turpentine. It is estimated that the value extracted from each tree per year is five francs. But in forty years the tree goes sterile, and there were millions of these trees ready to be cut into railway sleepers, and inch planks badly needed for the war. The French Government had difficulty in buying them from the unsophisticated peasants. A government official went with a Bank of France cheque to close a deal with one old forester near the Spanish border. It was for a quarter of a million francs, and a fortune for the old man. He tore the cheque up as worthless; he could only think in tree values, not in coinage. For several weeks the deal hung fire, and then he exchanged the sterile forest for a productive one fifty miles away, asking as his profit one hundred ex-



CABLE RAILWAYS BRING DOWN AN UNENDING SUPPLY OF LOGS IN THE VOSGES

tra trees. The rapidity with which the Canadians cut the forest amazed the Frenchmen, who called them the "madmen of Canada." They were all good friends, though, and hundreds of the poor folks who had never had the services of a doctor or been in the hospital were treated free by the kindly surgeons attached to the corps. As in the Vosges and Jura, the Canadians who worked in the Landes and Gironde also left the mark of the new world when peace called them back to Canada. The hospitals remain and funds have been raised for a French staff to keep them going. New railroads built by the men from overseas link up hamlets that never thought to see the ribs of steel. It was a quaint experience for the men from overseas, and it was a strange temporary awakening for the people of the Landes.

MEMORIAL TREES

THE MEMORIAL TREE, "the tree that looks at God all day and lifts her leafy arms to pray," has become the tribute of the people of the nation to those who offered their lives to their country in the Great War for civilization. In the tree planting the people find opportunity to express their love of him for whom the tree is planted. But the planting is not confined to doing honor to war heroes. Indeed the reports to the American Forestry Association show the people have seized upon tree planting as the finest way to mark centennials, important events in church history, the date of town foundings and similar events. The United States government has just placed its approval on memorial tree planting with the announcement that Memorial Trees will be planted in West Potomac Park near the famous Lincoln Memorial in Washington. The American Forestry Association made the suggestion for planting of memorial trees the day the armistice was signed and since that time tree planting has been taken up all over the country.

To the Christian Endeavor Societies of the World the Rev. Francis E. Clark has sent a call for memorial tree planting, not alone in honor of war heroes, although thousands of churches are planting trees in honor of members of congregations who offered their lives to their country when the call came, but in honor of famous pastors, leaders in church work and to mark important dates in a congregation's achievements. This call has resulted in giving tree planting a great impetus not only all over the United States but all over the world. In the schools and colleges of the country tree planting has been taken up as the means for keeping green the memory of graduates in war work. Georgetown University, at its 130th Commencement, planted 54 Lombardy poplars, one for each of her sons who gave his life to his country. These trees are marked with the bronze markers designed by the American Forestry Association. The National Farm School near Philadelphia has consecrated a "Patriotic Grove" in which are planted trees for her war heroes, friends of the school, and "Festive Trees" marking dates of births, confirmations, betrothals and wedding anniversaries. This form of tree planting will doubtless spread for it is easily seen what a tree will mean to a man or woman if it was planted to mark their birth. It is the same idea that is prompting many college classes to plant memorial trees when entering or leaving a school.

One of the most pretentious plans undertaken in tree planting was at the U. S. A. Balloon School at Fort Omaha, Colorado. Col. Jacob W. S. Wuest has directed the plant-

ing of about six thousand trees. Of this number nearly one thousand are in memory of men who passed through that camp and the one at Fort Crook, and died in the service. The unique feature about this is that the planting was done with the proceeds of "The Gas Bag," the official publication of the balloon school. The next of kin are marking the trees with the bronze marker of the American Forestry Association and registering the trees on the Association's national honor roll. The first chapter of the Daughters of the American Revolution to plant a memorial tree is the "Our Flag" Chapter of the District of Columbia. The tree was planted at the home of Mrs. Laura C. O'Hare. The League of American Pen Women was the first woman's organization to plant a tree in the District. This was planted at the home of Mrs. George Combs.

In Golden Gate Park, San Francisco, a "Hero Grove" has been planted in honor of the California heroes of the



This bronze marker for Memorial Trees may be obtained from the American Forestry Association. It costs \$1.00. Send the name and regiment of the man for whom the marker is desired.

war and at Camp Kearny, near San Diego, the Coloradoans of San Diego are planning to plant memorial trees in honor of the Colorado soldiers who passed through that camp. In the planting of trees to mark an important date, the Memorial Tree at Camden, New Jersey, is perhaps the most interesting. The tree was planted to mark the 100th birthday anniversary of Walt Whitman, the "good gray poet," by the Whitman Park Improvement Association. But tree planting has spread around the world. The Ardlethan public school in New South Wales has planted memorial trees in memory of each

Ardlethan soldier and in Queensland 30,000 trees have been planted in Anzac Park. Of this number 16,000 are for men who gave their lives at the call of the Mother Country.

Another phase of tree planting with great possibilities is the planting of trees along the motor highways of the United States. Make these highways "Roads of Remembrance," says Charles Lathrop Pack, president of the American Forestry Association, who has issued a call to every county to co-operate with the road builders. This "Roads of Remembrance" idea is being furthered in Great Britain by an organization of which Millicent H. Morrison is the secretary. The United States Army Motor Transport Corps now has a motor train crossing the country from Washington to San Francisco. Millions of dollars have been voted for good roads.

With this in mind and the Army demonstration underway thousands of people are expected to urge beautifying these roads by the planting of memorial trees.

MEMORIAL TREES ARE BEING PLANTED BY



Photo Underwood & Underwood
In Bedford Park, Brooklyn, Boy Scouts plant trees in honor of Col. Roosevelt.



Whitman Park Improvement Association plants a Memorial Tree in honor of Walt Whitman at Camden, N. J. to mark the centennial of the poet's birth.
Photo Public Ledger



Photo by J. R. Clarke
Agricultural Classes of Fremont, O., High School planting Memorial Trees.



At Gorham, N. H., eight Memorial Trees were planted following a parade.



Photo Kimble
Boy Scouts of Trenton, N. J., plant 50 trees in honor of Theodore Roosevelt.

COLLEGES, MUNICIPALITIES AND INDIVIDUALS



Photo Harriett Ewing
Georgetown University plants 54 Lombardy Poplars in memory of her sons who gave their lives to their country. The trees were marked by the American Forestry Association and registered on its national honor roll.



Planting the first pine tree in "Hero Grove" Golden Gate Park, San Francisco, and firing salute over Obelisk when "Hero Grove" was planted. The Obelisk had been buried beneath wreaths of remembrance sent by mothers and widows of California's heroes.
Photo San Francisco Examiner



NATIONAL HONOR ROLL MEMORIAL TREES

Trees have been planted for the following and registered with the American Forestry Association, which desires to register each Memorial Tree planted in the United States. A certificate of registration will be sent to each person, corporation, club or community reporting the planting of a Memorial Tree.

Cordele, Georgia—John L. Gunn and J. B. Ryals, by United Daughters of the Confederacy.

Washington, District of Columbia—Soldiers and Sailors, by "Our Flag" Chapter, D. A. R.

Godfrey, Illinois—Ovid Radcliffe, by Summerfield School.

Sterling, Illinois—Merrill Benson, Harry Heisman, Byron Lancaster.

White Hall, Illinois—Francis Grimes, by White Hall Senior High School—John Moore, by Junior High School—H. D. McCracken, by White Hall Schools—James M. Lyons, by White Hall Music Club.

Collamer, Indiana—Boys of Collamer, by the school.

Huntington, Indiana—Carl Grossman, Harry Satterwaite, Graham Scott, Elizie Erehart, Earnest Slocum, Alden L. Haller, Charles Beard, Charles Whitelock, Robert Mayne, Carl Timmer, Charles A. Smith, Hugo Taylor, Edward D. Hoover, James Sheller, Floyd Stuart, Garland Robbins, Elmer Fyson, Edward Hasty, by the Women's Civic Improvement League.

Skowhegan, Maine—Twenty-sixth Division, by Reformatory for Women.

New Bedford, Massachusetts—Theodore Roosevelt, by New Bedford and Fairhaven Council of the Boy Scouts of America.

Waltham, Massachusetts—Charles C. Bacon, by First Parish Church.

Detroit, Michigan—Lieut. Col. G. B. Walbridge, Major Edwin Denby, Major John H. DeVisser, Capt. E. C. Barkley, Major Geo. C. King, Major W. C. Cole, Capt. Wm. Lawrence, Lieut. C. F. Clarke, Lieut. A. A. Leonard, Sergt. Jos. Durand, Jr., F. J. Campbell, A. A. MacDiarmid, A. N. McFayden, F. J. Robinson, S. W. Wirts, Irvin Long, T. G. Phillips, and A. G. Pittelow, by Detroit Rotary Club.

Tipton, Michigan—Paul Gilbert and C. L. Bailey, by Spring Brook Lodge, K. of P.

Gorham, New Hampshire—E. J. Bourasse, J. A. Guerin, N. P. Castonguay, Ernest Dupont, G. H. Wentworth, C. W. McGown, O. C. Reid, and W. S. Holmes, by Gorham Women's Club.

Belleville, New Jersey—Michael A. Flynn, Thomas J. Mooney, Michael J. Murry, Harry C. Hoag, Charles A. Schaffer, Harry Blekiski, Fred W. Stockham, Charles McGinty, by St. Peter's Parochial School—W. S. C.

Bain, Jr., and H. M. Garside, by High School—Theodore Roosevelt, by School No. 5—George Eyre, George S. Smith, by School No. 1.

Elizabeth, New Jersey—Former Pupils of William Penn School, by William Penn School—Theodore Roosevelt, by Public School No. 12—Michael Gagliardo, Edward Corris, Benjamin Brower, by Public School No. 6—Former Pupils, by Philip Carteret School.

Hackensack, New Jersey—Albert A. Kleiber, by First Baptist Church.

Harrison, New Jersey—Charles E. Shanaburg, Donald Pegg, Thos. Krotik, Frank Policastro, Howard Quinn, Oscar Grell, by Edison Lamp Works.

Cohoes, New York—Peter Charles Allery, William J. Burns, John J. Blanchette, John R. Bickley, Alphonse Briere, Charles F. Cunningham, Eugene Clements, Anthony Curro, John B. Durocher, Timothy F. Fennen, Sebastiano Guglielmo, Joseph Gadoua, Grover C. Jackson, Harold W. Jewett, John Johnston, Ernest A. Jewett, John Jamieson, Thomas A. Jones, George A. Kelley, John A. Kilfoyle, George B. Lambert, James J. B. Lighthall, Patrick Molesky, Thomas F. Manley, Frank E. Plumley, Edward Pilawski, Arthur Palin, Charles R. Rowan, Joseph A. Ryan, William J. Rafferty, Edward T. Ruane, William J. Rocheleau, James B. Soden, Arthur V. Soden, Thomas C. Surprise, George Turcotte, Clarence Van Wagner, Walter F. Van Derker, Charles Edward White, Raymond P. White, Dr. Clarence H. White, Robert Manogue, Edward Julian, George Burke, Leo M. Karanaugh, by Woman's Municipal Welfare League.

Delhi, New York—Eric S. Dumbell, by H. M. Dumbell.

Reading Center, New York—Foster F. Jessop, Leon C. Smith, by Study Club.

Ashtabula, Ohio—Harry Kochenderfer, John Green, Homer Dye, Casper Robert Keeney, and Fred Niles, by Ashtabula High School.

Canton, Ohio—Earl Dister Dobbyn, by the East Canton School.

Cincinnati, Ohio—General Foch, General Pershing, Joffre, Tim Willie, William Kluber, Field Marshall Haig, Edward Rickenbacher, Edward Roseler, Admiral Sims, E. McFarland, "Our Dead," "Heroes of Italy," King Albert, Woodrow Wilson, Ralph Wilkerson, Isador Dube, George Hedge, John Jentz, Quentin Roosevelt, William H. Taft, "Old Tiger," Gen. Peyton C. March,

Theodore Roosevelt, by the Opportunity Farm School—William Carter and Carl Koblinsky, by Mt. Airy School—Walter Hawk, William Bailey Gentry, by the Mt. Lookout Business Men's Club—Jacob Waechter, Alvin F. Zorb, F. A. Benzinger, W. H. Sohn, and Herman Koenig, by Vine School—Albert Bauer, Robert Baum, Edward Sauer, William Strietmeyer, William Ritter, Chester Price, William Painer, William Bierhorst, William Wagner, by Washington School—Walter Volkert, William Nippert, Theodore Roosevelt, by Winton Place School.

Goshen, Ohio—Louis Griffith, Edgar Cole, Guy Felter, Lewis Irwin, Floyd Waite, Clayton Fox, by Goshen Centralized School.

Marion, Ohio—Mrs. Mary A. Ruehrmund, Frederick Herman Harzer, Miss Elizabeth S. Ruehrmund, Mrs. Renata Ruehrmund Hinds, by Clara Ruehrmund.

Berwyn, Pennsylvania—Lieut. Thomas L. Bolster, by Mrs. Thomas L. Bolster.

Boalsburg, Pennsylvania—Alfred Calvin Witmer, by I. O. O. F.—William F. Taylor, by the Red Cross—Guyer Eugene Durst, by the Civic Club.

Huntington, Pennsylvania—Corp. F. D. McEwen, Oscar P. Beck, Frank Palmer Horrmmon, William Lister, William P. Spyks, Robert Bruce Houstine, W. Preston Kurtz, Howard Wise, Clair L. Hicks, Joseph F. Robison, Clarence E. Focht, Antonio Mardelli, by Ladies' Civic Club.

Middleburg, Pennsylvania—Joseph Covert, Jackson U. Fessler, John H. Gundrum, William D. Hackenburg, John A. Hartman, William J. Hartman, Corp. E. H. Hottenstein, Samuel O. Lauver, Erman E. Lepley, Corp. John H. Miller, Roy A. Musser, Corp. George L. Mulliner, Walter Page, Lieut. Wendell J. Phillips, Miles A. Renninger, Samuel M. Rine, Sherman I. Rowe, Sgt. Brewster C. Schoch, Grover Sholl, Hiram C. Steffen, Jr., Lieut. John W. Stepp, Ernest E. Stine, Ralph C. Spaid, Henry H. Sprengle, Charles Treaster, Boyd M. Warner, Theodore Roosevelt, by Shambach and Wagenseller.

St. Davids, Pennsylvania—Lieut. Wm. H. Sayen Schultz. One tree each by Emilie Sayen Schultz, Wayne Presbyterian Sunday School, Civic Club on Philadelphia Parkway.

Brownsville, Tennessee—Soldiers and Sailors of Haywood County, by Brownsville Civic League.

Nashville, Tennessee—Lieut. James Simmons Timothy, by Catholic Women—Lieut. John W. Overton, by Robertson Academy.

Cherrydale, Virginia—Frederick Wallis Schutt, by Ellen S. Wallis.

Appleton, Wisconsin—William Hageman, August Zuleger, Raymond Neuenfeldt, Raymond Kluess, by Zion Lutheran School.

THE WISHING TREE.

By J. R. Simmons.

This photograph shows the possibilities of the American or white elm as a memorial tree. The man who "constructed" this tree as an entrance to his home was laughed at for his pains, but time has demonstrated that



his faith was not misplaced. He took four sapling elms and planted them in a group, binding them together about twelve or fifteen feet from the ground.

In time the trunks grew together, giving the appearance of a single tree "on stilts." It is known as the "wishing tree," and small boys and girls in the locality believe that by walking in and out among the four legs of the trunk, a wish made in the process will come true.

The tree stands near the state highway in the town of Bridgewater, Massachusetts.

THE OLDEST tree on earth, at least as far as anyone knows, is the Boo tree in the sacred city of Amara-poorah, Burmah. It was planted, the record says, in the year 288 B. C., and is, therefore, about 2200 years old. Its great age is proved by historic documents, says Sir James Emerson, who adds: "To it kings have dedicated their kingdoms in testimony of a belief that it is a branch of the identical fig tree under which Buddah reclined at Uoa, when he was undergoing his apotheosis." Its leaves are carried away by pilgrims as relics, but, as it is too sacred to be touched, even with a knife, they can only be gathered after they have fallen.—New York Commercial Advertiser.

PHOTOGRAPHING FORESTS FROM THE AIR

BY LIEUT. LEWIS, R. A. F.

SO FAR as I know, air photographs have not been used up to the present, for other than war work, and my experience with them has been entirely in that sphere. Such marvelous results were obtained from them during the course of the war, particularly during the latter part, when planes, cameras and operators were more efficient and ground interpreters became more familiar with their work, that I think it is the duty of those of us, who became experienced in their use, to pass that experience on to those in commercial life, who are most likely to find it of value. The timber industry seems to me to be one in which their use has great possibilities.

For about a year of my stay in France, I was employed in the Intelligence Department, and among my duties was the interpretation of aerial photographs and the transferring of information thus gained, to our maps. Of course we already had maps on the country as it was before the war, but the defensive works constructed on both sides

would have necessitated elaborate surveys which, of course, it would have been rather dangerous to attempt in the vicinity of the front line trenches. By experience we learned to know the appearance on a photograph of the numerous defensive works in the enemy lines, trench systems, machine gun emplacements, trench mortar emplacements, gun pits, dug outs, wire entanglements, telephone lines, buried cable lines, and many other constructions became known to us, and the result was that our artillery could deal with these things, and the Canadian artillery have a decidedly efficient way of dealing with things that are bothering their brothers-in-arms, the infantry.

The average height from which these photographs were taken was from 6,000 to 8,000 feet. Now, if such accurate

results could be obtained at these heights how much more could be done with photographs taken, say from 1,500 feet, with nothing to ruffle the nerves of the operators?

I understand that the Government is to establish an aeroplane or hydroplane forest patrol for fire ranging purposes. Why not have these planes fitted with photographic outfits for the purpose of mapping that part of the country of which so little is known? The importance of it to the lumber industry seems to me, although not a lumberman, to be too great to be overlooked. I have found an idea of how this work might be done for the

lumber companies.

They might make arrangements with the Government to have their own limits photographed, merely paying rent for the machine while on their work, and the cost of the photographs, approximately \$4.00 per dozen. This would cut out the necessity for having machines, operators, and cameras of their own.

First of all, take the timbered area which carries a

variety of trees, it need only be a small area. Have it accurately cruised, or better still, have a survey made of this one small area and have species of trees given and also condition of ground as to rock, outcropping, etc. Then have this area photographed at two seasons of the year, preferably in the spring, before the leaves come out on the deciduous trees, and then again when they are in full leaf. These photographs will be taken from a known altitude in order to arrive at a scale. Have them carefully analyzed in every detail and records made. They could then be used as standards in analyzing photographs of any tract of timber land, and I am quite sure that an accurate estimate could be made of standing timber, burnt over areas, areas fit for forestation and reforestation and also the water in the vicinity. If photo-



AN INDICATION OF WHAT THE AEROPLANE CAMERA MIGHT DO IN MAPPING THE FORESTS OF CANADA

There is a lamentable lack of forest maps in the Dominion. Some aviators claim they can distinguish tree species by examining stereoscopic photographs and by other methods. This, of course, would be only of general value and the ground cruise would always be necessary. Note the remarkable boldness of outline at 15,000 feet. (A photograph taken on the French front.)



HOW WOODED AREAS ARE DEFINED BY CAMERA FROM 15,000 FEET IN THE AIR
The strips of white and grey in blocks represent cultivated land, the difference in shading being accounted for by various crops, hay, grain, stooked and uncut fields, meadow, etc.

graphs were taken with a stereoscopic camera they could be viewed through a stereoscope and undulations of the

come enthusiastic interpreters of air photographs.—
(From the Canadian Forestry Journal of March, 1919.)

ground which would tell the direction of the flow of streams observed. I should imagine, however, that the map would be sufficient to show this.

If a stated altitude is maintained in taking all the photographs they will naturally be of the same scale and a continuous photographic map of any area can be obtained. Each company could have a natural photograph of its own limits hanging on the wall, could see exactly where logging is going on, and if they wish to do so, could keep track of the progress of the work.

I do not for a moment suggest that photography would be a means of dispensing with cruising in the woods, but I think that it would be of great assistance to cruisers and eventually they will all want to be-

UNIVERSITY OF MINNESOTA OFFERS COURSE IN LUMBER USES

LUMBER dealers, manufacturers of timber products contractors and carpenters, who have need of specific instruction in the proper selection of the material used in their industry, will find in the course, "Lumber and Its Uses," offered by the General Extension Division of the University of Minnesota, just what they have been looking for. The course is based upon R. S. Kellogg's text by the same name, and uses as supplementary material a large number of valuable pamphlets issued by lumber associations on grades, sizes, characteristics, etc., of the various woods. It also furnishes a valuable bibliography on such subjects as preservation and seasoning, strength tests, grading and scaling, as well as in the general field.

The kind and grade of wood selected for any use should be the one best adapted to that use, all things considered. The timber dealer must know the qualities of the material he handles well enough to select the best for his own use or that of his customers. If a cheaper timber properly preserved can replace a more costly kind, he should know

it. Timber having been in use so long, it is falsely assumed that dealers know the material well. They do know it in a general way; but it is only in recent years that specific information regarding woods has been sought in laboratory and testing room and given to the public. The matters of wood structures, of tests of strength, durability, preservation and other questions are now being settled in a scientific manner. Results of such tests are included in the correspondence course given by the University of Minnesota.

Many persons are now interested in the use of wood in the manufacture of airplanes either as a matter of general interest or with the idea of becoming inspectors of these woods. It is, of course, impossible to train an inspector in such a short course as this; but much valuable information along this line can be obtained as a sound basis for future work. Only a true understanding of the qualities and peculiarities of wood structure can give an adequate idea of the difficulties encountered in this, or, indeed, in any form of wood manufacture.

**WE WANT TO RECORD YOUR MEMORIAL TREE PLANTING. PLEASE ADVISE
THE AMERICAN FORESTRY ASSOCIATION, WASHINGTON, D. C.**

THE USES OF WOOD

WOOD USED IN THE COOPERAGE INDUSTRY

BY HU MAXWELL

Editor's Note:—This is the thirteenth in a series of important and very valuable articles by Mr. Maxwell on wood and its uses. The series will thoroughly cover the various phases of the subject, from the beginnings in the forest through the processes of logging, lumbering, transportation and milling, considering in detail the whole field of the utilization and manufacture of wood.

THE cooperage industry includes the manufacture of barrels, kegs, staves, heading, hoops, and other articles made of staves.

The growth or decline of this industry from year to year cannot be conveniently shown, because the government compiles statistics only every five or ten years, and

the cooperage associations have never brought figures together except in the most superficial way. It is known, however, that the cooperage industry is fairly stable and does not vary much from year to year. The greatest influence recently has been the prohibition movement which has threatened to lessen the demand for barrels for spirituous liquors. Such barrels constitute a rather small part of the cooperage industry as a whole, and the

diminution in the output of whiskey barrels will not greatly lessen the cooperage production in the country. Similar changes have taken place before in the cooperage business, as in the substitution of bags for barrels for cement, sugar, and flour; and pipelines and tankcars in place of barrels in the transportation of oil. In spite of such changes and fluctuations, the cooperage business has moved steadily on. What has been lost in one direction has been made up in another.

There are two kinds of cooperage, commonly distinguished as "tight" and "slack." Tight vessels are intended for liquids; slack for dry articles. Classes and grades come between the two extremes. The barrel that carries alcoholic liquors is considered the highest class of tight cooperage, while the vegetable barrel is typical of

slack containers. The slack barrel end of the business is the larger, judged by quantity of wood required in manufacturing the product; but tight barrels demand a much higher grade of wood. The value of the slack stock used in the country is nearly fifty per cent more than the value of the tight material. Nearly any wood is suitable for some kind of slack cooperage, but only a few are serviceable for tight.

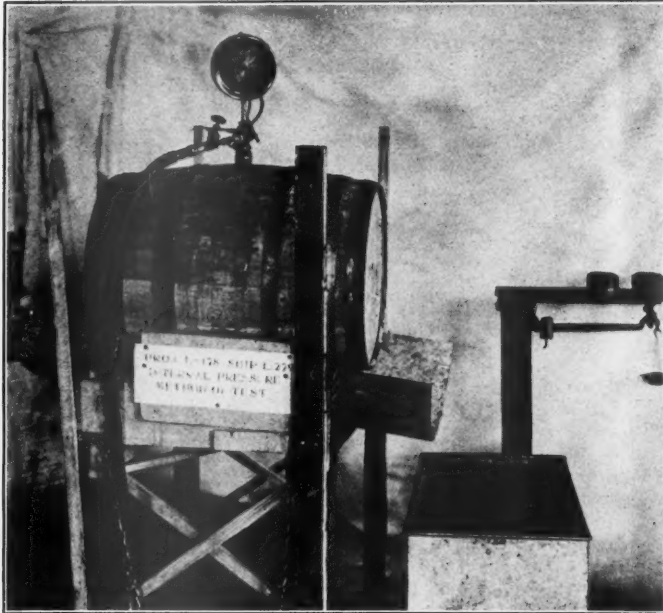
All cooperage whether tight or slack

is made up of three parts, the staves, the heading, and the hoops. No barrel is constructed without all three of these, though certain patterns of veneer drums combine the staves and the hoops in the wooden sheet that forms the body of the vessel. No well defined line of demarcation separates the barrel from the hamper or stave basket, and sometimes it is not easy to say which is which. The manufacturing of the three parts often constitutes three separate industries, a mill or factory confining itself to



A MODERN WINE CELLAR

This wine storage room is underground at the Cresta Blanca Winery, Livermore, California. A peculiar and very high-class of cooperage is used, the heads of the casks being oval instead of circular. The underground tunnel assures an even temperature and contributes to the perfection of the wine. Photograph by courtesy of the California Grape Protective Association, San Francisco.



A LABORATORY BARREL TEST

The pressure is applied within and the amount of it is recorded for future reference. When the force becomes too great for the strength of the wood, the staves are forced apart or they break, or the head gives way, or the hoops may break and the barrel go to smash, which of course puts an end to the test.

one of them alone. The three parts are often brought together by the user who assembles them as the barrels are needed; but not infrequently a single factory turns out finished barrels which are then distributed to the users. The woods for the three parts are not always interchangeable. Heading woods may not be satisfactory for staves; that for staves may be objectionable for heading; while hoop woods are not wanted for heading or staves. Steel is being substituted for wood in cooperage, there being steel barrels without a particle of wood; but the most common substitution is wire or strap metal for hoops.

In the year 1909 there were in the United States 1,506 establishments producing slack cooperage. They manufactured 2,029,548,000 staves, 140,234,000 sets of heading, and 375,793,000 hoops. Usually sixteen slack staves, two sets of heading, and from four to eight hoops make a barrel, but great variation occurs in different kinds of barrels and kegs. The values in the United States in 1900 were, staves, \$11,477,399; heading, \$6,138,881; hoops, \$2,578,845. The following list shows the woods from which the slack staves were made, and the number made from each:

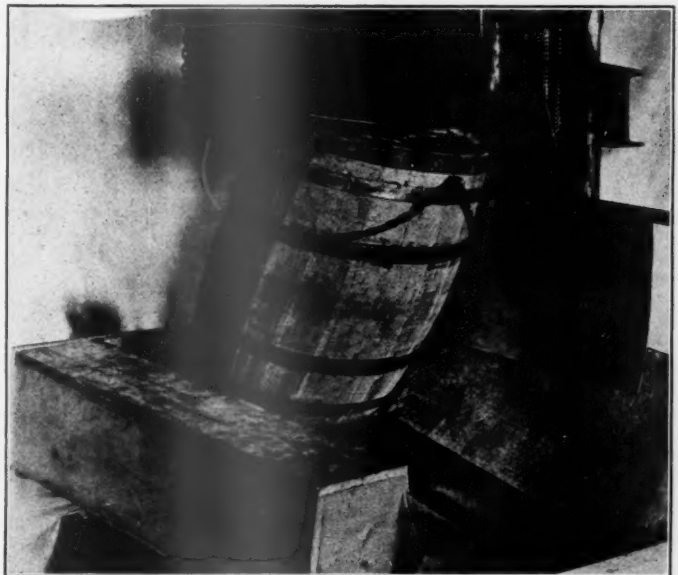
Red gum, 416,570,000; pine, 306,621,000; beech, 268,237,000; elm, 245,172,000; maple, 133,255,000; chestnut, 93,290,000; birch, 78,897,000; basswood, 72,537,000; spruce, 72,219,000; ash, 71,705,000; oak, 66,675,000; cottonwood, 66,260,000; tamarack, 28,832,000; cypress, 25,673,000; tupelo, 22,500,000; sycamore, 17,831,000; hemlock, 10,376,000; cedar, 9,410,000; yel-

low poplar, 7,851,000; balsam, 6,037,000; Douglas fir, 5,165,000; willow, 3,287,000; all other, 1,128,000; total, 2,029,548,000.

Room exists for considerable choice of wood for staves in slack cooperage, but not so much for containers of liquids. Flour barrels were once made principally of cottonwood staves, but elm has proved to be a good substitute. A white wood that presents a clean appearance is wanted, and it must be tough enough and strong enough to carry the load. It must be free from odor or taste that might injure the contents. The sugar barrel demands material of the same kind.

Red gum leads all other woods because it is abundant and satisfactory. The shippers of butter, lard, meat, and other food products select the most suitable woods for their barrels. Custom has much to do with it, but not all; for it is easy to understand that a pine barrel might taint food with the taste of turpentine. The hardwoods are demanded in three times the number for slack barrels as are the softwoods; yet many commodities go to market in softwood barrels and kegs. Scrub pine is used for nail kegs and for containers of other small hardware. Timber which is fit for little else, and poles only a few inches in diameter, are sawed into staves.

All of the stave woods listed above are likewise used for heading, except cypress; but pine heading is consumed in twice the amount of any other, and beech stands second, with red gum third. The heads of various sizes are cut with special machines. Slabs from sawmills, are cut in rather large quantities into heading, and by combining a slack cooperage operation with lumber pro-



HARD BUMPS IN PROSPECT

This test was made at Madison, Wisconsin, by the Government, the purpose being to determine how much tumbling and bumping a filled barrel will stand before it bursts. Barrels get such treatment as this while being loaded and unloaded in the process of transportation by wagons, boats, steam trains and other methods.

duction, better utilization of the wood is secured. The coopers use the waste from the sawmill. Short and defective logs can be worked into staves and heading. Michigan leads all other states in slack cooperage production.

In the production of hoops, Ohio leads all other states, and is followed in the order named by Indiana, Michigan, Missouri, and Arkansas. Woods suitable for hoops are not so numerous as those for staves and heading. Toughness and strength are essential in hoop woods, for the hoop must bend without breaking. Following is a list of hoop woods and the annual output of hoops from each in the United States:

Elm, 339,477,000; red gum, 9,877,000; pine, 8,321,000; birch 6,051,000; beech, 3,560,000; ash 2,020,000; oak 1,160,000; maple, 731,000; spruce, 106,000; basswood, 30,000; cedar, 5,000.

Though these figures were published under government authority, those purporting to give the production of pine hoops have been

questioned by manufacturers who do not believe that so many pine hoops are made. The unfitness of pine for hoops throws suspicion on the figures.

Two styles of wooden hoops are in use, the coiled and the straight. The coiled hoop is manufactured from logs,

the wood being elm almost exclusively; and the straight hoop may be so made, or it may be shaved from little saplings called hoop poles, each large enough for one or two hoops. If two hoops are made from the pole, it is first split down the center and a hoop is shaved from each half. The making of hoops from hoop poles was one of the earliest wood-using industries of America, and the

history of the business would read like a romance, though it deals with no very startling events. Some of the earliest hoops made in this country bound fish casks in New England, tar barrels in the Carolinas, and tobacco hogsheads in Virginia and Maryland. A number of woods were available for this commodity. In New England the long, pliant whips of white or oldfield birch (*Betula populifolia*) were the best, and most of them still wore the bark on one side when they went on the barrel or keg. Further south hickory held its ground as a hoop pole wood against all rivals; and very early in Virginia's history a writer sounded the



WHITE FIR KEG FOR SHIPPING GRAPES

This product, both container and contained, is of California origin. The packing for the grapes is redwood sawdust instead of cork dust which is used in Spain in packing grapes for export. Large numbers of fir kegs are required by the shippers of grapes from the Pacific Coast to the eastern states and to foreign countries. Photograph by courtesy of the California Barrel Company.

warning that so many choice young hickories were being made into hoops for tobacco hogsheads, that future hickory forests would suffer. Frequently thirty or forty hoops were used on one hogshead; not all at once, but it was the custom to cut off the hoops and expose the tobacco



CARVED HEAD OF AN OVAL CASK

California wine makers take much pride in their oval casks which are of large size and great strength. The carving on the one here shown is a work of art. It is in the cellar of the Beringer Brothers, St. Helena, California. It was on exhibition at the San Francisco world's fair. Photograph by H. F. Stoll, secretary of the California Grape Protective Association.

to view whenever a prospective buyer appeared, and afterwards replace the staves and put on new hoops.

The hoop pole business was once active in nearly all the eastern and middle western communities, and the name "Hooppole" is carried by more than one county to perpetuate the memory of an early flourishing business



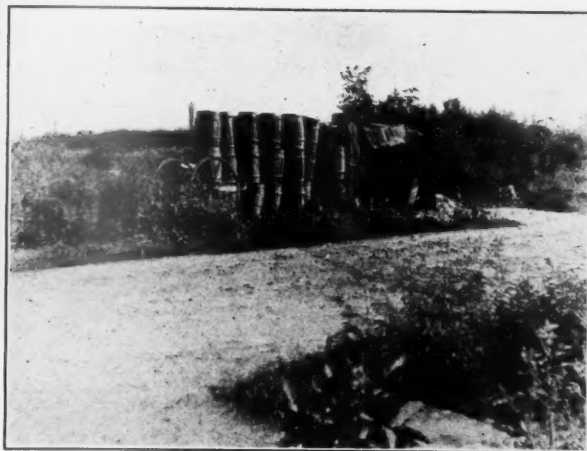
A TYPICAL MOUNTAIN STAVE MILL

Small plants like the one here featured are located near the source of timber supply, and after working up what is in easy reach, move on to another location and there repeat the process. The bolts are usually split in the woods and hauled by teams, or on cheap tramways, to the mill that saws the staves. It is an Arkansas scene.

in this branch of cooperage. A number of woods, besides birch and hickory, are good for hoop poles.

Extensive use is made of barrels and kegs as shipping containers, and in some places they compete with boxes while in others they hold the field to themselves. The life of a barrel is put down at one year by the trade, but that is not enough. A majority of barrels are used many times. They begin as sugar or flour barrels, and are then sold to the farmer for shipping his produce to market. It

may be said that they are returned to him several times, carrying potatoes to the market on the first trip, and tobacco or lettuce on the next, each cargo being lighter in weight than the previous one, owing to the weakened condition of the barrel. Finally the barrel may serve out its life work as a trash receptacle, and in the end can be used for fuel. Thus it may be said that a barrel fills



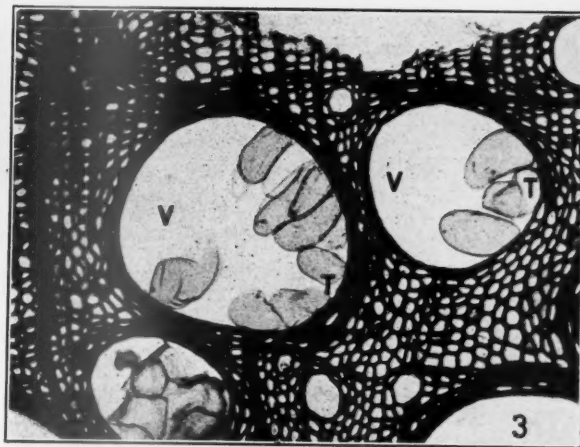
HOUSE MADE OF BARRELS

Empty barrels may serve purposes never meant by the makers. Above is a picture of a human abode constructed of barrels, near Evanston, Illinois. It was occupied by junk dealers as a home during several months, including winter weather when the thermometer fell to 19 below zero. Tarred paper served as a roof and a stove furnished heat.

as useful a career as almost any other manufactured article, and its life is much longer than a season.

The demand for barrels is constantly growing, because modern machinery has made it possible to make them for the trade cheaper than almost any other form of durable package. That it is the most convenient form of package has long been acknowledged.

The heaviest demand comes from the cement business, and flour ranks next, closely followed by sugar and salt.



WHY BARRELS OF WHITE OAK DO NOT LEAK

Alcoholic liquors seep through the staves of most woods but not those of white oak, because its pores are plugged by a growth called tylosis. The above picture is from a highly magnified photograph of this growth in process of plugging white oak pores, preparing the wood for "tight cooperage." The illustration is by Miss Eloise Gerry in the Journal of Agricultural Research.

As containers for fence staples, bolts, nuts, nails, and packages for roasted coffee, spices, crockery, fruits, and vegetables, they follow in the order named. Glass manufacturers, baking powder companies, liquor distillers, and candy, tobacco, and cheese packers are big users of barrels. The demand for barrels for molasses, oil, lard, and pork, is also enormous, while dry paint, glue, snuff, oatmeal, screws, castings, and general hardware articles annually increase the demand on the cooperage supply.

Some woods are waterproof, others are not. Alcoholic liquors and some oils will pass through the pores of some woods where water will not go. The wood of which a whiskey barrel is made may absorb a gallon of whiskey, without any passing through the staves and escaping. Some woods are so porous that barrels made of them will not hold water very long. Coopers learned by experience that certain kinds of wood made better staves than others, when the barrels were intended for liquid. It was wholly a matter of experience at first, but later the microscope helped to explain why some are proof against seepage

and others are not. All wood is more or less porous. It is made up of hollow cells, connected one with another by small openings, all microscopic in size; but some of the hardwoods have openings much larger than cells. They are tubes running through the wood, up and down the trunk of the tree, and are called pores or vessels. Some of them, as in oak and ash, are large enough to be seen by the unaided eye, by inspecting the end of a

freshly cut stick. These pores are responsible for the fact that some barrels will not hold liquid. It seeps into the pores and flows along them until it passes entirely through the staves and escapes. That is why wood with large open pores is not suitable for tight barrels.

White oak has always been considered the best tight cooperage wood. Many years ago it was thought that no other could or should be used for certain liquid commodities, but others have lately come into use. Yet, white

oak has large pores, and a casual observer noting that characteristic would conclude that it is not good for tight barrels, but experience shows it to be good. Though it has large pores which may be easily seen, they are not open. They are closed as a bottle is closed with a cork, and liquid cannot enter. The plugging substance, which is known as tylosis, is of a whitish color and is deposited in the pores by the wood itself, in the progress of the tree's growth and maturity. It occurs principally after the sapwood has changed into heartwood.

Red oak's pores are not plugged.

Therefore, red

oak is not suitable for the best kinds of tight cooperage.

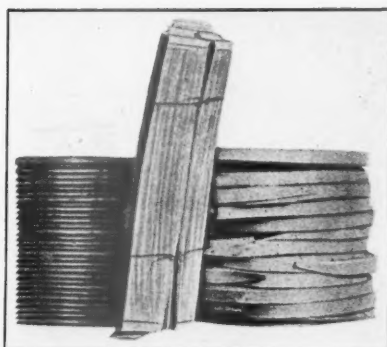
The condition of the pores, whether they are plugged or not, explains why fewer woods are available for tight than for slack cooperage. The following table gives the kinds and the number of tight staves made from each of several woods annually in this country:

White oak, 217,019,000; red oak, 30,619,000; basswood, 30,589,000; gum, 23,566,000; pine, 20,648,000; ash, 5,568,-



GAUGING PRESSURE ON THE BARREL'S SIDE

When barrels are carried in the holds of ships and in barges they are often piled one upon another ten feet high or more. Not infrequently the superincumbent weight breaks the barrels in the lower tier. This test was made to obtain an idea what barrels lying on their sides will bear.

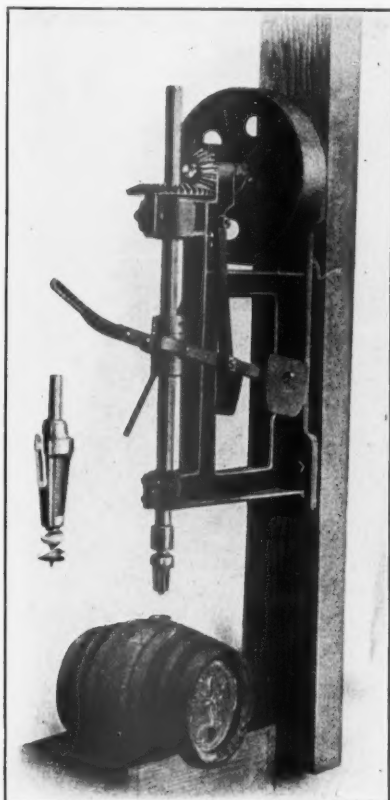


SHOOKS READY FOR SHIPMENT

A barrel consists of three parts, the staves, the heading and the hoops. That is true for all wooden barrels whether they are for dry commodities or for liquids. The bundled material sufficient for one barrel is called a shook. It is much cheaper to ship a shook than the barrel after it has been set up and completed as a barrel.

ooo; all other, 13,250,000; total, 341,250,000.

Only the best wood is used as barrels for alcoholic liquors; but some other woods will do for other kinds



A BUNG BORING MACHINE

Coopers have machines for nearly everything they do. The boring of bungs is shown in the above picture. The machine is designed to "bore and bush" in the same operation. The boring is a particular piece of work and if it is not done exactly right there will be trouble with leaks later when the barrels are filled with beer. Hand boring is apt to be defective.

of liquors, such as brine for pork, vinegar for pickles, and for certain oils.

Tight barrels are of several sizes. The strongest, heaviest staves are for beer barrels and kegs. The staves are manufactured by several different processes and are named accordingly, as sawed, hewed, and bucked and split. The tight cooperage industry is well distributed over the country but is more important in some sections than in others, depending largely upon the available supply of suitable timber in the various parts of the country. The leading states in annual production of tight staves are here given:

Arkansas, 87,582,000; Kentucky, 45,694,000; West Virginia, 40,402,000; Mississippi, 39,052,000; Tennessee, 35,744,000; Ohio, 26,534,000; Missouri, 22,420,000.

The waste of wood in the manufacture of tight staves in the past has been very great, but it is not now so great as formerly, because utilization is closer, and material which would have been thrown away formerly is now converted into other products. Much of the finest oak of the country was cut for staves in past years. The makers of this commodity went ahead of lumbermen in new territory, and being first in the oak region, they naturally selected the best oak trees, took the choicest portions of the trunks, and rejected the rest. They made no attempt to use wood which did not split well, and the stave maker's verdict: "It won't rive," was final and consigned the tree to the waste heap. It meant the abandonment of an oak trunk which might contain 3,000 or even 5,000 feet of lumber. That does not often occur now, for a sawmill is usually within reach and what cannot be split for staves can be sawed for lumber, or the logs may be sent to a mill equipped to saw staves or heading.

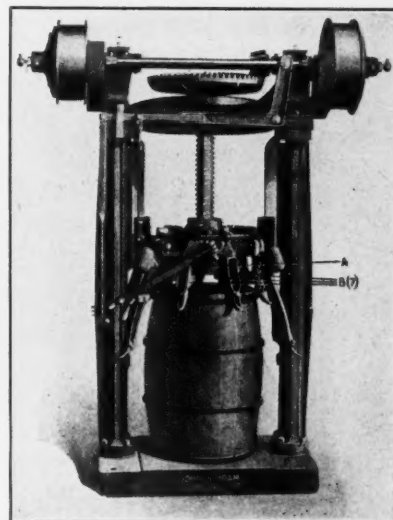
It was once a common situation in forests where stave makers were operating for the ground to be covered with refuse billets and bolts which were left to rot because they



EXAMPLE OF TIGHT COOPERAGE

The barrel here shown illustrates the class of cooperage known as tight. The barrels are intended to hold liquids. Not only must the joints be leak-proof, but the wood must not permit seepage through the pores. This barrel is of white oak, which is the highest grade of wood for tight cooperage.

were not just what the operator wanted. The workmen had no compunction when they left on the ground enough oak to make a thousand staves. Good trees were plentiful, and the stave makers turned their backs upon heaps of slightly defective bolts and went to work with their axes to fell other



A BARREL TRUSSER AT WORK

Machines have been devised and perfected for doing most parts of barrel making. The hand workman formerly did it all, from felling the tree to finishing the barrel, but appliances have been invented which need only to be set in motion and directed by the brain of man, and they will do the rest.



FIFTY-THOUSAND GALLON REDWOOD TANKS

Cooperage of unusual size is here shown. These receptacles are part of the plant of the Hercules Powder Company at San Diego, California. Redwood was employed because of its well known resistance to decay, and the closeness with which its joints may be fitted. The photograph was supplied for this illustration by the California Redwood Association.



BARRELS WHICH HAVE SEEN BETTER DAYS AND BETTER DUTY

The description of this picture should not be made too explicit nor the exact locality be pointed out, for the moonshiner must not be disturbed during business hours. The name of the photographer is unknown, but the camera told an interesting story. It needs no embellishment.



SETTING UP THE SLACK BARREL

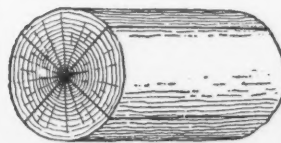
Shooks are often made near the source of the timber, but the barrel is frequently put together and completed near the place where it is to be used. Skilled hands can do the work very rapidly. The illustration shows apple barrels and is from the catalogue of J. D. Hollingshead, Louisville, Kentucky.

trees. Even when the operator had no fault to find with his timber, he usually left twice as much on the ground as waste as he took away as staves. Families living near the stave operations in the forests often secure sufficient waste oak to provide household fuel for years; and most of it was of such high grade stuff that it would have passed inspection by any furniture factory, had it been sawed into lumber instead of being split and slaughtered in the process of stave making.

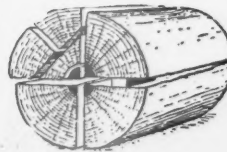
Staves were saleable at good prices at a time and in regions where no market for lumber existed, and for that reason the stave operator was in advance of the lumberman in new country. Little capital was required in making staves when the farmer owned plenty of good oak timber, could buy a crosscut saw for eight dollars, an ax for a dollar, iron wedges for a dollar, a froe for the same, and could make his own maul, mallet, and wooden gluts; and the fork of a log served him for a riving horse. Thus equipped, he was ready for business. He had few labor bills to pay, for

he could do all the work without going outside of his own family for assistance. Some stave making is still done along similar lines, but not much. Oak stumpage now has value, and it is pretty hard to carry on the smallest operation without the investment of some cash capital. Less dependence is placed on hand labor than formerly and more in machinery; and machines are expensive.

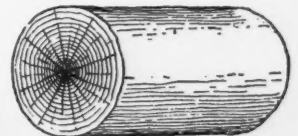
Bungs and faucets are listed as cooperage though they are sometimes considered as belonging to the subdivision of wood-ware, which is regarded as a separate industry. The bung closes the opening in the barrel; a spile or spiler is a small plug for closing a vent in a barrel or cask; while a faucet or spigot is a contrivance for drawing



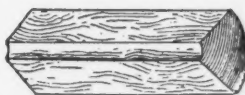
Shows manner of splitting timber into stave bolts where timber is of small diameter.



Shows manner of splitting section for timber of large diameter into stave bolts. In making staves, as well as heading bolts, for oil and other tight work, it is ever and always necessary to keep with the grain of wood.



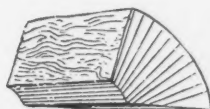
Shows section of log as cut, 3 feet long, for stave bolt.



Stave bolt quartered and heart split off.



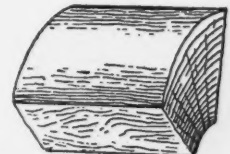
Bolt cut to uniform length on Bolt Equalizer ready for cylinder stave sawing machine.



Shows manner of sawing pieces of heading from Bolt by the Head Sawing Machine. They are cut 1 inch thick upon sap, $\frac{3}{4}$ inch thick at the heart, 24 inches long. Two or three pieces are required to form a complete head.



Shows manner of sawing staves upon a cylinder stave machine.



Shows heading prepared from tree same as in stave bolt.

THE PROCESS OF SPLITTING STAVES

Art, science and experience are necessary in the production of the best split staves. More skill is required to make them with maul, mallet and froe, than with saws. The accompanying series of diagrams is from the catalogue of the Oram Barrel Machinery Company, Cleveland, Ohio.



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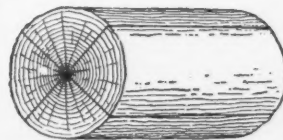
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trees. Even when the operator had no fault to find with his timber, he usually left twice as much on the ground as waste as he took away as staves. Families living near the stave operations in the forests often secure sufficient waste oak to provide household fuel for years; and most of it was of such high grade stuff that it would have passed inspection by any furniture factory, had it been sawed into lumber instead of being split and slaughtered in the process of stave making.

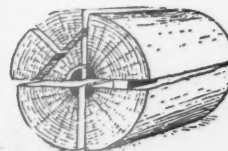
Staves were saleable at good prices at a time and in regions where no market for lumber existed, and for that reason the stave operator was in advance of the lumberman in new country. Little capital was required in making staves when the farmer owned plenty of good oak timber, could buy a crosscut saw for eight dollars, an ax for a dollar, iron wedges for a dollar, a froe for the same, and could make his own maul, mallet, and wooden gluts; and the fork of a log served him for a riving horse. Thus equipped, he was ready for business. He had few labor bills to pay, for

he could do all the work without going outside of his own family for assistance. Some stave making is still done along similar lines, but not much. Oak stumpage now has value, and it is pretty hard to carry on the smallest operation without the investment of some cash capital. Less dependence is placed on hand labor than formerly and more in machinery; and machines are expensive.

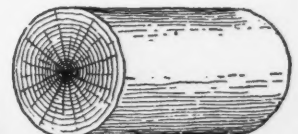
Bungs and faucets are listed as cooperage though they are sometimes considered as belonging to the subdivision of wood-ware which is regarded as a separate industry. The bung closes the opening in the barrel; a spile or spiler is a small plug for closing a vent in a barrel or cask; while a faucet or spigot is a contrivance for drawing



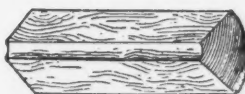
Shows manner of splitting timber into stave bolts where timber is of small diameter.



Shows manner of splitting section for timber of large diameter into stave bolts. In making staves, as well as heading bolts, for oil and other tight work, it is ever and always necessary to keep with the grain of wood.



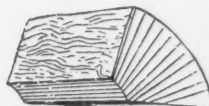
Shows section of log as cut, 3 feet long, for stave bolt.



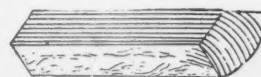
Stave bolt quartered and heart split off.



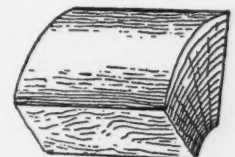
Bolt cut to uniform length on Bolt Equalizer ready for cylinder stave sawing machine.



Shows manner of sawing pieces of heading from Bolt by the Head Sawing Machine. They are cut 1 inch thick upon sap, $\frac{3}{4}$ inch thick at the heart, 24 inches long. Two or three pieces are required to form a complete head.



Shows manner of sawing staves upon a cylinder stave machine.



Shows heading prepared from tree same as in stave bolt.

THE PROCESS OF SPLITTING STAVES

Art, science and experience are necessary in the production of the best split staves. More skill is required to make them with maul, mallet and froe, than with saws. The accompanying series of diagrams is from the catalogue of the Oram Barrel Machinery Company, Cleveland, Ohio.

TUSSOCK MOTH CATERPILLAR CAMPAIGN

BY M. M. BURRIS, CITY FORESTER

DURING the past few years the tussock moth caterpillar has been doing very much damage to the shade trees of Trenton. Conditions were becoming unbearable. There were not sufficient funds to do any spraying on the street trees and so this pest continued its ravages unrelentlessly.

There was but one thing to do—to collect and destroy the egg-masses on the cocoons. We followed the same procedure as in our bird house building contest and enlisted the services of the school children in a campaign

to pick egg-masses, with the hearty co-operation of the Commissioner of Parks Burk, and Miss Ruth Scott, Director of Na-

and habits of this pest, the damage done by it and the methods of eradicating it. The children were all interested, and promised to do their bit. The moving picture houses were of great assistance to the cause by showing caterpillar slides, which were prepared by us.

Through experience in the past, we discovered that prizes form a great incentive to children, and to prove to the children that the citizens of Trenton were actively interested in this campaign, it was decided to have some of the merchants offer prizes. The moving picture houses

were first to offer prizes. Eight theatres offered three prizes each; first prize, free admission for a three months' period;



THE VICTOR AND SOME OF THE SPOILS

Emil Jantz, a pupil of the McClellan School, who ranked highest in the number of individual cocoons collected.

ture Study in the Public Schools.

A meeting was called for January 28, which was attended by every principal and teacher interested in the preservation of our trees. Commissioner Burk and I explained the purpose of the meeting and spoke of the destructive work of the tussock moth caterpillar. Enthusiasm prevailed and the teachers and principals pledged their support to this campaign, which was decided upon to start on February 10.

We visited the various schools and spoke to the children on the tussock moth caterpillar. An excellent set of lantern slides was procured showing the life



HARD AT WORK

Pupils of the Harrison School busily engaged collecting the cocoons. Paper bags were often used as containers.



ROOSTING HIGH

These are some of the boys who worked so enthusiastically and successfully in Trenton's tussock moth caterpillar campaign.

second prize, free admission for a period of two months, and third prize, free admission for a period of one month. In a short time we received 50 offers of prizes, ranging from a ton of coal to a pair of roller skates. Commissioner Burk also

offered bronze and silver buttons to the boys and girls picking upwards of 500 cocoons.

The campaign started on February 10 and ended on May 1. During this period of less than three months, the total number of cocoons collected amounted to 2,961,932. The number of children having picked more than 500 cocoons was 421. Emil Jantz, led with 243,529;

Aoner Robinson collected 235,464; Benjamin Palby, 213,550; George Nelson, 190,315; Elmer Manesevitz, 158,500; Joseph Boduar, 126,392; Alex Elias, 106,347.

These figures talk for themselves. The campaign was truly a successful one. The children are interested, and are becoming more and more enthusiastic about trees.

Surely, these youngsters, in years to come, will be educated to the beauty and value of shade trees, and will see to it that the shade trees of this city are not neglected. The *Trenton Times* gave lots of publicity to the campaign and contributed in this way very substantially to its success.

FOREST INVESTIGATION

FOR some time there has been a growing conviction on the part of foresters in the United States that the amount of silvical research conducted by all agencies, including the Federal Government, is very inadequate. The war has emphasized this more than ever.

The southern pine region is still our largest center of lumber production, and the naval stores industry, even though it has materially declined in the last 20 years, is still the world's largest center of naval stores production. The growing area of cut-over land in the South which is not being utilized for agriculture and on which forest production, if there is any, is largely an accident, calls among other things for a much greater effort in forest research than has ever before been possible. Aside from the small amount of work which has been done by the Forest Service on the Florida National Forest and in co-operation with one agricultural station and in general studies, practically nothing has been done. Of fundamental forest research in the southern pineries there has been little or none. The South can be continued as one of our most important timber producing regions, but one basis for this must be a better knowledge of how to practice forestry.

Hardwood production in the United States is centered very largely in the Appalachians and neighboring States. This field has been covered during the past 25 years by a series of investigations which have helped to answer immediate questions, but fundamental problems at the basis of the practice of forestry have hardly been touched. A very large acreage in this region, because of topography and soil, is most suitable for timber production including the woodlot, as well as the larger areas in which can be grown timber for the general market. Practically unlimited markets are immediately at hand and close utilization is possible. The number of species is very large and practically all of them have well-established usages. In this diversified forest many problems of silviculture require solution and some provision should be made for attacking them on an adequate scale.

Similarly in the Lake States comparatively little has been done to lay the foundations for the practice of forestry on the large areas of potential timberland which are now so largely waste. Continued timber production of both softwoods and hardwoods is possible on a large scale, but on the basis of present attempts at forest research the foundation for proper silvicultural methods can not be laid for many years to come.

In New England there is a limited amount of forest research under way by a considerable number of agencies,

no one of which is covering the field adequately. The Federal Government is doing practically nothing. It is probable that a reasonable effort by the Federal Government in this region would serve to round out and stimulate and unify the activities of other agencies so that the forestry problems of the New England States could be solved within a reasonable time. In this region, as we all know, the evolution of lumbering and the gradual drift towards forestry has gone further than anywhere else. We now have probably a better opportunity for the practice of forestry on private lands than in any other part of the United States, barring mandatory provisions.

Even in the West, to which the research activities of the Forest Service have had to be mainly directed during the last 10 or 15 years because of the necessity of information on which to base silvicultural practice in the National Forests, the extent of the work has been far from satisfactory. Within the last five years in order to put the work on a satisfactory basis at fewer places it has been necessary to reduce the work in California very materially, this in spite of the importance of the problems which are pressing for immediate solution. The work in California should again be taken up and in other parts of the West it should be materially enlarged.

There are also other lines of forest investigation which relate equally to all regions, as for example, forest mathematics, a subject which received more or less attention in the Forest Service some years ago but which it has been impossible to cover in any satisfactory way during the last four or five years. Here we have such problems as forest growth and yield, volume tables, scaling problems, and mathematical relationships between height, the diameter, volume, and form of trees, a large and important field on which the efforts of a number of men could be devoted for a number of years with results of the greatest importance to foresters and to the forest industries. There is another group of problems which could well be centered at a forest research laboratory, such as fundamental seed studies and forest biological studies in general.

The time has now come for much closer co-operation in forest research between the Federal Government, the States, the forest schools of high standing, and the State Experiment Stations, with the latter particularly on woodlot problems. Much more can be accomplished by some attempt at unification of effort of reasonable Federal assistance to the States or forest schools on lines of work mutually agreed upon, either in the loan of men or the allotment of funds, or in such other form as may

seem most advisable. Such co-operation should, therefore, be recognized as an essential part of the general program of enlarged forest research in the United States.

It should be recognized that the success of the efforts to secure adequate recognition for this work must depend in a very material degree upon the demand for the work outside of the Federal Forest Service. The present Federal appropriations for silvical research as approved by the House at the short session of Congress is about \$78,000. The Senate Committee added \$25,000 to this amount. It is believed that the general program above outlined could be carried out by an increase of this appropriation to \$200,000, and at the next session of Congress an effort will be made to have this amount appropriated for the work.

PAID IN FULL

THE following is a brief sketch of Captain Homer Smith Youngs, forestry official and university professor, who gave his life as the salient of St. Mihiel was wrested from the grasp of the Hun: Born in Stillman Valley, Illinois, September 26, 1892. Graduated from Belvidere, Illinois, High School. Enrolled in the University of Idaho School of Forestry, September, 1910, where he won highest honors both as a student and a marksman, and specialized in Forest Engineering and in Grazing. Accepting a position with the Forest Service, District 4, as Chief of Party in charge of primary triangulation, he prepared the base maps for grazing reconnaissance on which he was later engaged for some time. Early in 1916 he was appointed Grazing Examiner for District 1, with headquarters at Missoula, resigning in September of that year to accept a teaching position in forestry at his Alma Mater.

On January 5, 1917, he was married to Anne Geraldine Parker, of Los Angeles, and in the same month he passed the examination for second lieutenant, receiving his Commission April 1. On May 15 he was ordered to the Presidio at San Francisco and was commissioned first lieutenant on June 5. On August 29 he sailed from Hoboken to join the 16th Infantry, which had crossed with General Pershing in July, and first saw active service at the front in November, 1917, where he distinguished himself as a sniper because of his unusually accurate long-range marksmanship. In December he was sent to a British Army Scouting School for further training in methods of scouting and sniping, this training being further supplemented by observation and patrolling in the British trenches at the front. He received his captaincy on January 1, 1918, and on returning to his regiment was made regimental intelligence officer, in which position, he had charge of most of the patrols that went out from his Division—the famous First Division of the First Army. At Picardy he was seriously gassed and in the hospital for six weeks but again joined his regiment on the Champagne front where a shell, which ex-

ploded in a dugout containing three officers, killed the other two and left Captain Youngs unconscious and seriously injured from shell-shock. After two months in Base Hospital No. 8 he again joined his regiment on September 1, and on September 30, in the great battle of St. Mihiel, he went over the top for the last time fighting in the Argonne Forest until October 4, when he received a severe wound in his right shoulder severing nerves which necessitated the amputation of his right arm on October 30. He was never able to bear the strain of



A FOREST HERO OF THE WAR

Capt. Homer Smith Youngs, Co. E, 16th U. S. Infantry.

moving to a base hospital and on November 23 blood-transfusion was resorted to but he died on the morning of November 24, 1918. He now sleeps in Brizeaux Village, just south of the Argonne Forest.

He leaves a young son, Homer Smith Youngs, Jr., whom he had never seen.

Without ostentation, but with dispatch and thoroughness, fearlessly and dauntlessly, his work was done. Those who knew him best loved and trusted him most. He died in the service of his country which he loved so well, and of whose splendid young manhood he was such a perfect type in every sense. His life; his example; his supreme sacrifice, should not be permitted

to fade from the memory of American foresters and all those who enjoy the blessings of liberty and justice vouchsafed by such as he.

His friend and teacher,

C. H. SHATTUCK,

A GARDEN OF THE BRAVE

By Vilda Sauvage Owens, in The New York Times

I sometimes dream that in the years to be,
When France shall rise once more, resplendent, free,
One lovely corner there shall be a grave—
A Garden of the Brave.

And in my dream I see a quiet nook,
That nestles by a silver, running brook.
Brave Belgians sleep within this lovely spot,
'Neath blue forget-me-not.

And close beside, where all is rest and peace,
Acre on acre of the fleur de lis.
Here where the very angels watch are keeping,
The sons of France lie sleeping.

Great masses of the wondrous wattle here,
Where stanch Australians rest. And very near,
A mighty avenue of maple trees,
All gold and crimson, fling with every breeze
A cloud of little winged seeds, that fly
Where brave Canadians lie.

Beneath a coverlet of shamrock rest
Old Ireland's sons, her bravest and her best.
And hark! The music of the pipes! They play
Always where buried Scotchmen sleep, they say.
And purple thistles whisper in the dells
To bonnie heather bells.

Old England's roses here, the white and red,
Where sleep in countless graves her gallant dead.
Here, too, the tiny English daisies grow.
The soldiers loved them so!

And further still, a little nook, yet dear,
The friendly sunbeams love to linger here,
Where glowing California poppies nod,
And yellow goldenrod.

I dream that as the years move on apace,
We'll fare as Pilgrims to this hallowed place,
And pause beside each fragrant, flowering glade,
Or rest beneath the leafy maples' shade,
And hold communion there in love divine,
And pray, as at a shrine!

FOREST RESERVE FOR KENTUCKY

THROUGH the gift of the Kentenia-Catron Corporation, which owns thousands of acres in Eastern Kentucky, the State has acquired a forest reserve of 3,400 acres on Pine Mountain, Harlan County. The land is not underlaid with coal and has no agricultural value. It is the first reserve the State has acquired and J. E. Barton, commissioner of forestry and geology, who has been trying for several years to secure such a tract, said that it will afford an excellent opportunity to demonstrate reforestation and the proper method of propagating trees and lumbering.

PLANT MEMORIAL TREES

MORE AIRPLANE PATROLS FOR NATIONAL FORESTS

TWO additional routes in the patrol of national forests by Army airplanes, to give early warnings of fires in the forests, have been arranged by the War Department and the Forest Service, United States Department of Agriculture. The routes will be operated from Mather Field, near Sacramento, and were placed in operation June 1, on the same day as two routes operated from March Field, near Riverside, California.

The first route from Mather Field covers the Northern Eldorado and Tahoe Forests on the valley side of the Sierras. It starts from Mather Field and proceeds to Placerville, Colfax, Nevada City, Strawberry Valley and Oroville, where the planes land at available fields. This route is to be covered in the morning of each day and the return trip made in the afternoon.

The second route from Mather Field covers the Southern Eldorado and Stanislaus Forests. Starting from Mather Field, the route goes to Placerville, Grizzly Flat, Big Trees and to a landing near Sonora or Tuolumne. This route is covered in the morning and return trips made in the afternoon. Both of the Mather Field routes have a round-trip length of about 150 miles.

Forest Service reports tell of a successful trial patrol undertaken recently. No difficulty was experienced in detecting fires in heavy timber at elevations of 6000 to 10,000 feet.



THE ROOSEVELT REDWOOD—FITTING TRIBUTE TO OUR LATE EX-PRESIDENT

A monument that has stood for ages and will stand for ages to come is the giant redwood tree in the Yosemite Valley which bears the name of Roosevelt. A more fitting tribute in memory of our late ex-president can hardly be imagined.

INSECTS IN THEIR RELATION TO FORESTRY

BY DR. R. W. SHUFELDT, F. A. O. U., ETC.,

MEMBER BELGIAN ORDER OF ST. JOHN OF JERUSALEM

(PHOTOGRAPHS BY THE AUTHOR)

FOR the past half century and more, the immense host of insects that are, to a greater or less degree, inimical to our forest, fruit, and shade trees, have been under investigation by entomologists in both public and private life. The indefatigable workers in the various Federal departments at Washington and elsewhere have contributed an enormous literature to this subject, covering every line of research embodied in the science; while the results they have achieved have been of the most incalculable value, not only to the country at large, but to those interested in trees of all kinds anywhere. This is true irrespective as to whether the latter be represented by our most extensive private or governmental forest owners, or by one having but a few trees under his care in any part of the United States, or in neighboring countries, whereon such insects occur.

As stated above, a large part of this literature, referring to the various forest-insect problems, has been published by the Government, and particularly by the Bureau of Entomology of the United States Department of Agriculture, of which Dr. L. O. Howard is the Chief. While a fairly generous supply of these bulletins and other publications are issued, they by no means reach all they should, nor supply the demand for them by those interested in the subject at large. This being the case, any extension of the knowledge of such matters, in any of its departments, should be regarded with favor; and to this end popularization of various phases of the science will, from time to time, be the object of this section of AMERICAN FORESTRY. In this work the bulletins issued by the

Forest Insect Investigations of the Bureau of Entomology, of which Dr. A. D. Hopkins is in charge, have been especially helpful, while in addition to such aid a great many actual observations, extending over many years, have been made by the present contributor in the

fields and forests. The observed phenomena thus studied will all be incorporated as the material is worked up and illustrated. Almost without exception the photographs of the matter described have been made from such material; and where certain insects have not been easily obtainable, they have been generously loaned the writer from the duplicate series in the United States National Museum collections. For such courtesies thanks are especially due to Drs. E. A. Schwarz and Harrison Dyar; to Messrs. Carl Heinrich, J. C. Crawford, H. S. Barber, and to others associated with them in the Bureau.

From the various sources of information brought down to us from the earliest time to the present day, certain primary facts have been established. In the first place, the list of insect forms that attack forest trees in this country is not an especially long one, when we come to consider the enormous array of species that are entirely innocent with respect to any such charge. Many insects

attack trees that have no claim to be classed as forest trees; while a formidable list of insects commit their depredations upon certain shrubs and plants, and never have anything whatever to do with trees. There are insects that feed only upon the leaves of forest and shade trees, causing damage to that extent alone; some of the bark beetles devote their attention to fully grown and

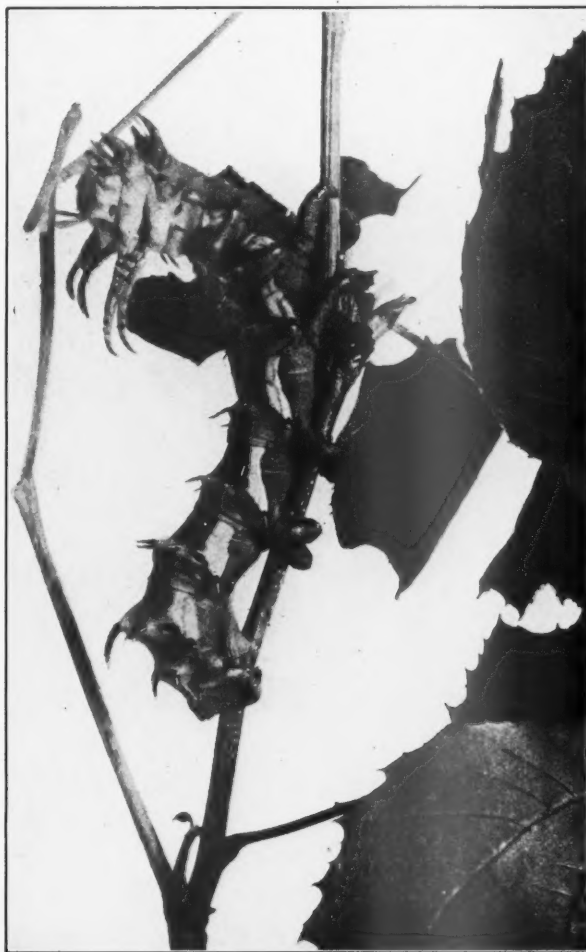


Fig. 1. THE LARVA OR CATERPILLAR OF THE REGAL MOTH (*Citheronia regalis*); NATURAL SIZE, FROM LIFE

This elegant larva of the Regal or Royal Walnut Moth is of an intense green color, with black and white markings. Its curious pairs of "horns" are brilliant scarlet, tipped with black. It is seen here feeding on the leaves of the sycamore tree.

sound trees, while other species do so wholly to dead or dying ones, or to fallen trunks of them in the forests and elsewhere. Then the roots of forest trees also have their special enemies, while others destroy the bark.

In so far as forest trees are concerned, perhaps the most destructive insects are the bark beetles, of which there are quite a large number of species. These beetles have, in times past, utterly destroyed forest trees covering hundreds of square miles, and they are committing the same depredations at the present time. They bore through the bark of pine, spruce, hickory, fir, and other trees—full-grown, healthy trees—and subsequently completely girdle their main trunks, which ultimately kills the tree so preyed upon.

In passing through the vast pine forests of the Southern States, as the writer has frequently done, one may plainly see the fearful devastation wrought by the various invasions of the common pine beetle of the South. Hundreds of square miles of dead pine and spruce trees may be seen in various stages of decay, the death having been caused by this pest. We may even observe the same class of destruction in its various stages in certain areas within the District of Columbia. Great quantities of useful timber have thus been lost to the country and the industries; while we may note similar destructive work in progress, and at all stages, due to the operations of the spruce beetle in the forests of those trees in northeastern United States and southeastern Canada.

"This species," says Doctor Hopkins, "caused the death of a very large percentage of the mature spruce over an area of thousands of square miles. In the aggregate many billions of feet of the best timber were destroyed. The large areas of this dead timber furnished fuel for devastating forest fires, with the result that in most cases there was a total loss."

More particulars on this vitally important subject will be brought out in future issues of *AMERICAN FORESTRY*, as well as observations on the destruction now in progress in our North American forests due to the attacks of other species of insects and their larvæ in still other regions.

Passing from these few introductory remarks on forest beetles to moths, we enter upon one of the most

attractive fields of inquiry and observation in the entire realm of biology. As in the case of all the biological sciences, it has its large literature, illustrated by thousands upon thousands of plain and exquisitely colored figures; while upon the other hand there is the entire world of nature ever standing open to the investigator for the verification of all that is set forth in that literature, and offering at the same time no end of new material for study and description. All this is equally true of the butterflies—a group so closely allied to the moths that they appear to almost run into each other. Now, in a great many instances, the larvæ of caterpillars

of both moths and butterflies feed upon the leaves of trees of many descriptions, those of our forests as well as the shade trees of our towns and cities. These insects may be studied with a great many objects in view; but this field is so extensive that to enter upon it in any satisfactory manner would result in the presentation of material far exceeding the limitations of the space at our command in the present connection. However, such information will be forthcoming from time to time, while right here it is proposed to briefly introduce one of the very handsomest moths in our insect fauna. This is the Regal or Royal Walnut moth, *Citheronia regalis* of Fabricius (Figs. 2 and 3). Its caterpillar is a most remarkable looking creature, and it is here shown life-size in Figure 1. A summer or two ago, Mrs. Bert



Fig. 4. ONE OF THE OLDEST BLACK WALNUT TREES IN THE ENVIRONS OF WASHINGTON, AND ONE THAT HAS PROBABLY SEEN FIFTY SUMMERS COME AND GO

Trees succumb from all sorts of causes. Old age has overtaken this one; but it has also been struck by lightning; partly strangled by vines; furnished food for thousands of larvæ, and weathered the gales of half a century.

S. Elliott, of Washington, D. C., was good enough to furnish me with more than a dozen living specimens of this grand larva of our Regal moth, they being transported on a big limb of a sycamore tree, bearing a great quantity of fresh leaves, which latter constitutes one of their foods in nature. In a reproduced photograph, this caterpillar is a rather tame-looking affair as compared with the living animal. To appreciate this, one must indeed see it in life, with its shiny, pea-green body, ornamented on the sides by an interrupted series of black and white markings; its red head and tail-plates; red and black feet, and its remarkable, double pair of curved, red and black horns on the segments just back of the head. Smaller horns, too, are seen elsewhere on the body, as shown in the cut. Country boys call this catterpillar

the "Hickory Horn-devil," and generally destroy it upon discovery. It has an average length of some five and a half inches, and is the largest caterpillar in our insect fauna. It does not spin a cocoon, as many other large caterpillars do; on the other hand, sometime in September, it works its way under ground, there to be

the unconsumed ones removed. After all the larvæ have disappeared under ground, the box may be kept in a dry and moderately warm room until the following summer, when your moths will be forthcoming—and what superb creatures they are upon emergence!

Butterfly larvæ, of a great many species, genera, and families, also feed upon the leaves of various trees of the forest, and among them we find not a few representatives of the genus *Papilio*, which is a truly gorgeous assemblage of forms; they may be reared from their chrysalids in the manner recommended in the last paragraph in the case of moths.

A few miles west of Washington, along the old Georgetown Canal, is a great place to meet with the Ajax Swallowtail—a butterfly of extreme beauty (Figures 5 and 6). There is a good reason for finding the insect in

that locality, as in the marshy area between the tow-path and the Potomac flourish many Papaw trees (*Asimina triloba*), and it is upon the leaves of these that the caterpillars of the various forms of this butterfly feed. On one occasion, in this locality, the writer captured three of these lovely butterflies with one sweep

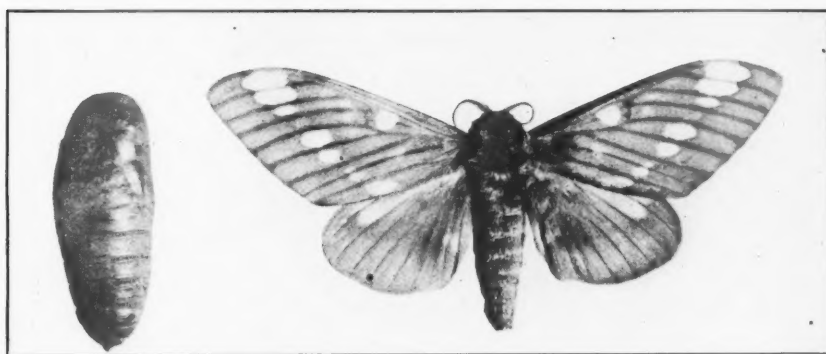


Fig. 2. MALE REGAL MOTHS, VIEWED FROM ABOVE. SPECIMEN IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM. THE DARK BROWN PUPA IS SHOWN TO THE LEFT. BOTH REDUCED ABOUT ONE-THIRD.

Here is an instance in the insect world where the male of the species is conspicuously smaller than its mate (see Fig. 3).

transformed into the pupa here shown in Figure 2, from which it emerges during the following July as an elegant orange-red moth, with the dainty white and yellow markings here seen in Figures 2 and 3.

This caterpillar feeds upon the leaves of the butternut, hickory, persimmon, sumach (*Rhus*), sycamore, and walnut trees. Of the last-named we have a victim in Figure 4. This moth is rare in the North and nowhere abundant; while in the State of Georgia it is said to be double-brooded. In this genus *Citheronia* we have at least two more species of these big moths, namely the "Pine-devil moth" (*C. sepulchralis*) and the Mexican Walnut moth (*C. mexicana*). Of the former Doctor Holland says: "It ranges from the Carolinas northward to Massachusetts along the coast. It is not common in the valley of the Potomac; and at Berkeley Springs I have found it abundant in the larval state in the months of July and August."

The third species is found in Arizona and northwestern Mexico. To rear and study this elegant moth—indeed, any of our large moths—one has but to place the larvæ or caterpillars in a large and thoroughly clean pine box containing about a foot or more of soft, dark soil. The top should have a fine wire-mesh cover that can be readily removed. Fresh leaves of the sycamore or other trees mentioned above should be fed to them every day and

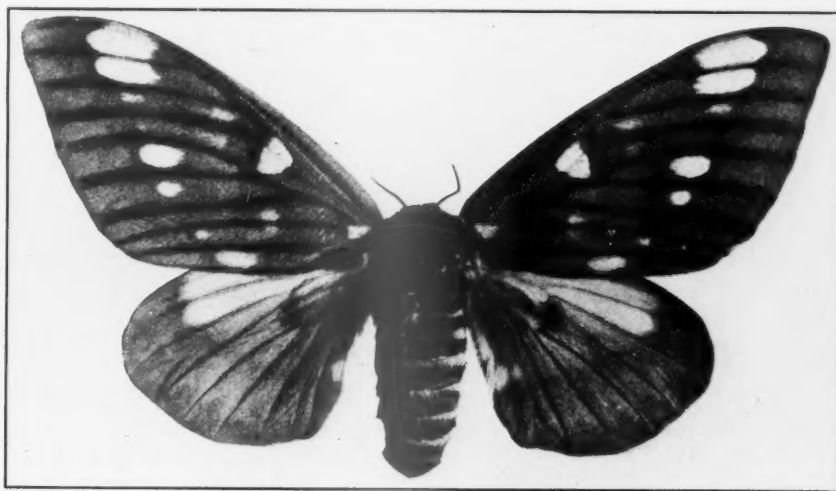


Fig. 3. A PERFECT SPECIMEN OF A FEMALE OF OUR REGAL WALNUT MOTHS; NATURAL SIZE, AND VIEWED FROM ABOVE.

This well shows how carefully these moths are mounted in our great collection in the National Museum. In coloration, this is a very striking species, hence its name, "Regal."

of the net, as they rested on the mud within a few feet of the Potomac. Upon reversing the net, two were taken and one escaped. Doctor Holland gives us a beautiful colored plate of these zebra butterflies in his "Butterfly Book," upon which five different subspecies of *ajax* are shown, as well as *Papilio eurymeda* of the same group, the one shown in Figure 5 of the present article being

Papilio ajax marcellus—male. *Walshi* is the winter form of *ajax*, the "chrysalids which have been exposed to the cold of the winter" produce it; "the black bands of the wings are narrower and a trifle paler than in the other forms, the tails of the hind wings tipped with white, and the crimson spot on the inner margin near



Fig. 5. FEW BUTTERFLIES IN EASTERN UNITED STATES CAN RIVAL IN BEAUTY THE FAMOUS "SWALLOWTAILS," AND OF ALL THAT GROUP THERE IS NOT A HANDSOMER SPECIES THAN THE ONE HERE SHOWN, WHICH IS WIDELY KNOWN AS THE "ZEBRA SWALLOWTAIL."

Butterflies of this zebra kind long puzzled the entomologists, for the reason that they were found to be seasonally polymorphic. The one here shown is the Ajax—a most remarkable insect.

the anal angle forming a conspicuous bent bar." In flight, this butterfly has the appearance of being white, banded with black (as in the cut for the under side), with the wings emarginated with a broad band of black; the red spot is quite conspicuous. It would seem that in certain localities these various types of *Papilio ajax* intergrade, making it a bit difficult sometimes to define and name them with absolute certainty. In any event, as it does a tree no good to have its leaves eaten up by caterpillars, and as the Papaw is a tree of some value along the streams that course through our forests, the caterpillar of this handsome butterfly must be considered in the light of an insect inimical to it.

Speaking of the early stages of the genus *Papilio*, Holland says that "the eggs are somewhat globular, flat-

tened at the base, and smooth. The caterpillars are cylindrical, smooth, fleshy, thicker in the anterior portion of the body than in the posterior portion, and are always provided with osmateria, or protrusive scent-organs, which, when the larva is alarmed, are thrust forth, and emit a musky odor, not highly disagreeable to the human nostrils, but evidently intended to deter other creatures from attacking them. The chrysalids are always attached by a button of silk at the anal extremity, and held in place by a girdle of silk about the middle. The chrysalids are, however, never closely appressed to the surface upon which pupation takes place."

It is surely very remarkable how the caterpillar can attach the delicate little girdle of silk that goes about its waist, or the "button" at its abdominal extremity, during the transformation performed through pupation. It has not been the writer's fortune to observe this up



Fig. 7. WE HAVE HERE AN ENEMY OF THE BLACK OAK—A BEETLE KNOWN AS THE BROAD-NECKED PRIONUS (*Prionus lat-collis*)

During the first two weeks in July, this big, black *Prionus* emerges at twilight, and may frequently be captured around the street-lights of eastern cities. This is a Washington specimen.

to the present time, notwithstanding the fact that many papilionian larvæ have been kept by him during their transformation to the pupa stage, and, after that, until the butterflies emerge from them. The suspending girdle is invariably adjusted with the greatest care, in the same place, with the head of the pupa above, and the very

firm fastening of the tip of the abdomen below. This, it will be seen, holds the pupa in such a way that the median longitudinal line of its body makes an acute angle with the plane of the surface to which it is attached.

Thus hangs the pupa of a *Papilio*! But why it should apparently be obliged to be suspended in that manner, while the pupa of an *Argynnis*—such as one of our Silver-spots for example—should only be suspended by the end of the abdomen, is surely difficult to explain.

As has already been noted in a previous paragraph, the larvæ or caterpillars of our moths and butterflies feed upon the leaves of trees; but the beetles, upon the other hand, are far more destructive, for, as a rule, they attack the bark, the true wood within, and the roots. An excellent example of such insects is seen in the Broad-necked *Prionus* (*Prionus laticollis*) of Drury. In Packard's report on Forest Insects we find a cut of this species, with figures showing the larva and pupa, after Riley. The beetle is illustrated in the present article in Figure 7, which is from life. Generally, this insect

is discovered living in the trunks and roots of the trees known as the Balm-of-Gilead and the poplar; but Mr. F. Clarkson found, many years ago, specimens of this borer infesting the Black oak. He reported in the *Canadian Entomologist* (XVI, '95) that "their presence is quickly realized by the odor of the female, which is very powerful, and can readily be detected 20 feet distant. I placed a female, immediately after emergence, in an uncovered jar; and wherever I positioned it, on the piazza or elsewhere, the males were attracted from every direction.

I captured twenty males in a very few minutes. Oak Hill cannot boast of a Balm-of-Gilead or a Lombardy poplar, but it is famous for its oaks; and while it is admitted that the former trees as mentioned by Harris, serve as food for the larvæ, my observations indisputably prove that they feed also upon the roots of the oak."

This beetle is of a blackish brown color, shiny, and exhibits no markings whatever. It is a strong flyer; and when on the ground it gets along with considerable rapidity, especially when not impeded by the vegetation

or the coarse, pebbly character of the ground or soil. Frequently they make their appearance in the streets of our towns and cities at night, apparently attracted by the lights in the streets and windows of our dwellings. This *Prionus* is a hard, strong beetle, requiring a pretty stiff blow to crush it. Its jointed antennæ are of a fair length only, though stout and beautifully jointed with short joints. When at rest, each one exhibits a gentle curve outwards and somewhat backwards. Its eyes are rather large, while one of its most striking char-

acters is the unusual width of its neck, which, upon either outer margin, presents a pair of pointed processes, one in the middle and one occupying the supero-external angle. Its outer wings or elytræ are granulated, and so rather roughish; while mesially, the ultimate segment of the abdomen projects beyond them. Finally, we may say that its three pairs of legs, having the same color as the rest of the insect, are rather stout, but otherwise in due proportion to the size of the insect.



Fig. 6. ONE OF THE LOCKS ON THE GEORGETOWN CANAL IN THE EARLY SPRING OF 1919. A FEW MILES WEST OF WASHINGTON, D. C., AND A FINE LOCALITY FOR COLLECTING

Some of the finest sycamores anywhere are to be found in this region; sometimes they are seen to be double, as in this view.

GATHERING THE SPINULOSE SHIELD FERN

BY FRANK B. TUCKER

THE spinulose shield fern unexpectedly paid for my vacation several years ago. I never thought when I left New York late in August for a three-week vacation in the Green Mountains that I would return to the city with about as much money in my pockets as when I left. But such was the case.

While in no way bound to hide the identity of the place in Vermont where this happy windfall befell me, I do so, lest I give the village—if such it may be called—too great a prominence. It has but two houses that take vacationists. The largest may have accommodations for 40 guests; the smaller for a third this number. The native all-the-year-round population is about fifty.

The hamlet, for such it really is, is delightfully situated in a dilation of a valley of a branch of the Deerfield River, some nineteen hundred feet above sea level, with encircling summits rising another ten hundred feet. Save for the daily trip of a quasi public stage, that hires itself out for passengers, mail, baggage and freight, and an occasional automobilist on a tour of exploration, the place is unlinked to the busy world. And until the advent of the fern industry it contributed no article of commerce to the world.

About ten years ago a shrewd eyed native of the locality saw a fortune in the perennial crop of the spinulose shield fern that for countless years had grown prodigally in the moist woods roundabout. Stories are told of the penury of his circumstances before he conceived the idea of marketing the ferns, contrasted with his present affluence; but one and all acknowledge him as the benefactor of the community.

The spinulose shield fern I have seen growing in luxuriant abundance in the New England and Middle Atlantic States. Books on ferns state that it is to be found from North Carolina to northernmost Canada. I could not find it, however, in the mountains of western North Carolina, though I searched for it carefully. The books omit any mention as to how far west it grows—a question of some interest to me; for I was told that the Vermont crop was sold mostly to the florists of Chicago and Denver. Three feet is about its maximum growth; its width will average about one-third of its length. It is an ever-

green, very hardy, of a darker, richer green color than the other ferns that grow indigenous with it, and of a feathery, lace-like texture. Brown fruit specks dot its underside at picking time, and its stalk is somewhat scurfy.

It is very gregarious, six to a dozen or more stalks clustering about a common center, the clusters grouping themselves often into beds covering a considerable area. It grows in moist woods, being especially thick near water courses. It likes the cooling protection of boulders and of fallen, decaying trees. Often it takes root in the latter's crumbling, pulpy wood, or in some crevice of the former where a little soil has found lodgment, growing as hardy as its fellows in the fertile soil of the woods.

Picking begins about two weeks before Labor Day and lasts about five weeks. Everyone is welcome to pick; all are treated alike by the dealer. When the picking is good and the pickers numerous he pays them thirty cents for a thousand ferns, bunched. When the supply of ferns near his agency has been picked, and it becomes necessary to go deep into the woods for them, pickers are not so numerous, and the price rises to forty cents a thousand. While in the spring of years when his sales have been heavy, sometimes before the snow has left the ground, he pays them ninety cents for a thousand ferns, bunched.

During the height of the picking season some families earn as much as ninety dollars a week, clearing some five hundred dollars during the season. To do this means working from early morning until late at night for every member of the family. The men folks start out early in the morning with big hampers, which they fill and deliver several times a day to their women for bunching, at which task the men also assist at night.

The money the pickers receive is all profit, save for the cost of the thread used to bind the ferns into bunches. A few of the heaviest pickers do pay the larger landowners a nominal amount for the exclusive privilege of picking on their land. This exclusive privilege, however, is of somewhat doubtful value; for though the land thus allotted is posted against the unlawful picking of ferns, little heed is taken thereof by pickers.



READY TO START IN THE MORNING

The land upon which I was privileged to pick as the guest of the owner was posted, but I saw many poachers. Conditions could hardly be otherwise. The country is very sparsely settled and unpatrolled, so that the cost to owners of enforcing the prohibition against fern picking is out of proportion to the privilege they grant. The notices, however, have a moral effect, for each time I noticed poachers they hurriedly scurried away.

Picking is not work—at least for those who do not do it for a livelihood. Mornings are long for early risers, at many summer resorts, and would have been at my Vermont hamlet had it not been for the ferns. Each morning after breakfast we started out for ferns. Our host very kindly loaned us hampers, into the largest of which, by careful arrangement, almost three thousand ferns could be packed. By noontime our hampers would be filled and our stomachs empty; for walking and climbing over the uneven ground of the woods, bending to pick the ferns and toting the hampers about made ravenous appetites.

The woods in the year whereof I write were the cleanest I have ever known them. They were absolutely free of bugs and insects, of creeping and flying things of any nature whatever. Picking under these circumstances was ideal, and was thoroughly enjoyed by all. Competition to be the first to fill a basket lent zest to the picking. Surprisingly little was said by the pickers, once they got started. Everyone took an absorbing interest in the work.



BUSY BUNDLING THE FERNS



THE COVETED SPINULOSE SHIELD FERN

and labored as if their very subsistence depended on getting the hampers filled. A squirrel looking on could not have but remarked that we were as provident as he in supplying the winter's larder.

To one picking for the first time a little difficulty will be experienced during the first half hour or so of surely distinguishing the spinulose shield fern from the brakes that grow

all about it, often seemingly from the same root. This difficulty, however, is short lived. After a day's picking the question never arises in one's mind; while after a couple of days' picking, one can separate the fern from the brake with the fingers, the sense of touch serving to distinguish the stalk of one from that of the other. And it is this sense of touch that distinguishes the expert picker from the beginner. A beginner chooses the ferns he picks solely by eye, and picks them one at a time. The expert gauges the size and quality of the ferns almost by the feeling of their stalks; and instead of gathering them one at a time his busy fingers take, in one operation, all those of the cluster that are of proper size. The ferns are not pulled up by the roots, but are broken off a few inches below the lowest frond.

It is hard to say which is the more interesting—picking the ferns or bunching them. Personally I prefer the picking, because of the exercise it affords. But as to which is the more fascinating I must admit that the palm goes to the bunching. A few men picking by themselves do their own bunching,

tying the bunches with thread from a spool carried in the pocket and run through a buttonhole. Most of the bunching, however, is done at night. A picker who does not do his own bunching, pays half what the ferns sell for to have them bunched.

I have seen a room full of people alive with laughter and jovialty before bunching began, gradually subside into a seeming contented watching of the silent bunchers; then as gradually to take a livelier interest in the work, and finally to actively participate. Once the whole



AFTER A GOOD MORNING'S WORK

room was bunching it became a silent race to see who would finish first, and who would have the greatest number of bunches, for it was always something of a lottery as to how many ferns a basket contained.

The ferns are put up in bunches of twenty-five. Each bunch must contain an assortment of sizes, varying from about nine inches to eighteen inches. The largest is laid on a table or other flat surface, and the others on top of it. The stalks of the twenty-five ferns are then bound together with a piece of thread. Time is not wasted to tie the thread; the end is simply wedged between the stalks.

The bunched ferns are delivered to the dealer usually in the same hamper used in picking them, with a memorandum of the owner's name and count. The dealer's agents verifies the count and so expert has he become in the handling of bunched ferns that he is able to tell pretty closely from the heft and appearance of a bunch whether it contains twenty-five freshly picked, well conditioned ferns. Saturday is pay day for the pickers. A record of the number of bunches delivered by each picker is carefully kept; and any time after the money arrives, a picker may collect his account. The certainty of the pickers receiving their money when due, and the acknowledged fact that the industry is a boon to the hamlet, seem to have been

elements in the success of this dealer. One's first thought on seeing this industry is to engage in it as a dealer rather than as a picker. But closer observation shows

this to be easier thought of than done. An organization of quite a size is necessary for its conduct. The ferns have to be kept in cold storage. The wastage is great, and considerable care is necessary to shield the fern from injury. If kept too long piled at the receiving station, it will begin to sweat, which is detrimental to its preservation. It seems also to be subject to a blight, which attacks it as a brown discoloration, and pickers are warned to allow no such ferns to be found in their bunches.

In the case whereof I write, the dealer had to pack his ferns in crates and truck them thirteen miles to the railroad, which took them twenty miles farther to his warehouse. At his warehouse he had to reinspect, re-sort and rebunch the ferns. From the locality where I picked he took ninety million ferns the previous year, how many more from other localities I did not

hear. When he started business he must have found the nearby markets quite fully supplied, and had to develop new ones. In no other way can I explain his sending them to such a distance as Chicago and Denver from Vermont.



ON THE WAY TO DELIVER

ATENTION is being given by the United States Forest Service to the importance of landscape engineering in the National Forests. One of the questions continually arising involves the proper way to lay out a summer camp site to make the most of the natural beauties of a location. Another has to do with the principle to be followed in running a scenic trail to insure the best views for the traveler. Still another deals with making ranger stations most attractive as dwelling places and the creation of designs which will best harmonize with the surroundings. To meet these and kindred questions Dr. Frank A. Waugh, an eminent landscape engineer of Amherst, Massachusetts, has visited a number of the Forests where recreation use is especially important. His trip was made at the request of the Forest Service. As a result he has prepared a report setting forth some simple principles of landscape engineering applicable to the various questions. These are intended to provide a basis for correct landscape engineering practice in the National Forests.

THE National Lumber Manufacturers' Association, with headquarters in Chicago, has compiled a handy reference of "Information on Wood and Where to Find it." This booklet is a directory of literature which may be had for the asking from the National Lumber Manufacturers' Association, California Redwood Association, North Carolina Pine Association, Northern Hemlock and Hardwood Manufacturers' Association, White Pine Bureau of St. Paul, Minnesota, Southern Cypress Manufacturers' Association, Southern Pine Association, West Coast Lumbermen's Association, Western Pine Manufacturers' Association and other sources, and is absolutely free.

Some of the subjects covered include: Barns, bee hives, bird houses, boats, bridges, bungalows, cars, canoes, cattle sheds, chicken houses, corn cribs, dairies, docks, factories, farm buildings, fences, freight cars, furniture, garages, incubators, kitchen cabinets, schools, silos, toys and warehouses.

THE HERONS

(Family Ardeidae)

BY A. A. ALLEN, PH. D.

ASSISTANT PROFESSOR OF ORNITHOLOGY, CORNELL UNIVERSITY

WHEN nature evolved the herons to enliven the shore, she did not take into account the avarice of man nor the vanity of woman. She created birds that should have stood for all time as the emblem of grace. Take away life and there remains an ungainly mass of spindly legs and crooked neck worthless even for food. Nature might have expected, therefore, that the herons would be allowed to live and delight the eyes of mankind forever. Unfortunately, however, she decorated certain of them during the breeding season with most beautiful and delicate plumes which retain their beauty even when ripped from the backs of their owners. Shrewd milliners, taking advantage of the vanity of women and the relentlessness of fashion, saw in these plumes great fortunes. Fashion and ignorance did the rest, so that today the most beautiful species, the egrets, are nearly extinct. Indeed they might long since have

been so had it not been for the determination of a group of bird lovers, who formed the National Association of Audubon Societies, and for the far-sightedness of a nature-loving President, Theodore Roosevelt, who set aside certain areas of waste land as Federal Bird Reservations to give the vanishing birds a last resort of safety.

There are about 100 species of herons in the world, found mostly in tropical and subtropical regions, but at least a dozen are found in the United States and Canada.

They vary in size from the least bittern whose body is not much larger than a robin's to the great blue heron that stands about four feet in height. In color they vary from the streaked brown plumage of the bitterns, through various shades of chestnut, blue and gray, to the snowy white of the egrets. They are variously ornamented with elongate feathers, either on the crown, foreneck, or as in the egrets, on the middle of the back. In the bittern

there are some fluffy white feathers beneath the wings that are displayed during the courtship performances.

The majority of herons are gregarious birds, roosting and nesting in colonies. They scatter when fishing, however, and hunt singly, either stalking quietly through the shallow water or resting motionless on the shore waiting for some hapless fish to swim within reach of their javelin-like bills. One species, however, the reddish egret, is said to run rapidly through the shallow water



Photograph by O. E. Baynard

WHERE AIGRETTES COME FROM

They are worn on the back of the beautiful egret herons during the nesting season. Egret at nest at Orange Lake (Florida) Rookery, an island bought and guarded by the National Association of Audubon Societies.

in pursuit of small fish. Most herons nest in the trees or large bushes of extensive swamps but the bitterns nest on the ground in treeless marshes. Herons' nests are always poorly made structures of sticks, so thin that the pale bluish or greenish white eggs can usually be seen from below.

Young herons are covered with long shaggy down when hatched and even before they acquire their real feathers, they are able to climb from the nest and cling



Photograph by Verdi Burtch

SKY SCRAPPERS

Great Blue Herons nest in the tallest trees of big swamps—Single trees sometimes contain from five to ten nests.

to the branches using their wings and even their necks to assist them. If they drop into the water below, they are able to swim, using their wings as well as their feet for propulsion, but their heavy bodies sink until only the head shows above the surface. When alarmed in the nest or on the branches, the young herons stretch up their long slender necks and remain perfectly quiet so that they look more like sticks than like birds. They are fed in an unusual way. The old bird, having swallowed the fish or frogs which it has caught, returns to the nest with them in its crop. The young bird then seizes, with a scissor-like action, the base of the bill of the old bird which turns its head on one side and vigorously but deftly disgorges the food into the throat of the

young. The process is rather difficult to describe in a few words but a glance at the accompanying photograph of the least bittern feeding its young should make it clear.

Three members of the heron family in North America are called bitterns and they inhabit the reedy marshes



NOT IN HIS ELEMENT

Young herons are not meant to swim like ducks but they get there just the same when they fall from their nests into the water.

rather than the tree covered swamps that are the favorite nesting places of the other herons. The American bittern is the larger of the two, being about the size of a large fowl, but of a very different shape, although some people call it the "mud hen." Its streaked brown coloration matches so closely the dead vegetation in the marsh that when quiet it is almost impossible to see.

This camouflage is furthered by a habit which the bird has when alarmed, of pointing its bill toward the sky and presenting only its broadly streaked neck and breast toward the intruder. As one circles about the spot where he knows the bittern is hiding, the bittern also slowly rotates so as to present always the same color pattern which matches exactly the lights and shadows of the reeds, and when the wind blows over the marsh, causing the reeds to sway, the bittern seems to perfect the simulation by swaying with them. Early in April when the bittern returns from the south and concealment in the marsh is scarce, it is easily overlooked because it resembles some broken snag projecting from the water. One of the most striking characteristics of the bittern is its call which has given rise to the names "stake driver" and "plum pudding." Though not actually very loud the sound is remarkably



Courtesy of National Association of Audubon Societies

THE COST OF A PLUME

This pathetic picture tells its own tale and needs no enlargement.

penetrating and can be heard for a distance of half a mile or more. The first part of the performance which sounds like the tapping of a wooden stake with a mallet is made by the bird snapping its long bill. Then follow some deep liquid notes that sound like the "working of an old fashioned wooden pump or "pouring water out of a huge jug;" *ooble-oob, ooble-oob, ooble-oob*. The sound is accompanied by curious gulping contortions but the bill is not held in the water nor is it filled with water as was once supposed.

The bittern nests on the ground, usually in the sedges fringing the marsh, but occasionally it builds its nest where the water is deeper. The eggs are about the size of small hens eggs and look as though they were stained uniformly with coffee.

The least bittern looks like a fair sized bird when seen on the wing or when sneaking through the flags, but it is

of the parts which are buff in the least bittern are a rich chestnut in the Cory bittern. It is a very rare bird as only about thirty specimens have ever been found and inasmuch as these have been scattered over a large part of the range of the common least bittern, from Florida to Ontario, many ornithologists now believe that it is



COFFEE COLORED EGGS OF THE AMERICAN BITTERN

They are laid on a platform of reeds, usually in the dryer parts of the marsh.

merely a color phase of the least bittern similar to the red phase of the screech owl. The term erythronism has been applied to this phenomenon where an excess of red pigment is developed.

Of the true herons, the little green heron is undoubtedly the commonest and most widely distributed. It is a



Photograph by O. E. Baynard

SCENE IN A PLUME HUNTER'S CAMP

Egret feathers mean the death of hundreds of birds and the starving of thousands of young.

mostly neck and legs and its body is relatively small. It has much the same habits of concealment as its larger cousin but its notes are very different, resembling the distant croaking of a frog or the slow cooing of a dove. Its nest is a platform of rushes built above the water, usually in the cat-tails or reeds, and its three to seven eggs are more like those of other herons, being pale bluish-white.

The writer once had the experience of tramping through a marsh and discovering one of the nests of this bird and actually counting the eggs before he realized that the bird itself was standing on the back of the nest, so completely did it simulate the dead stubs of cat-tails all about it. This particular bird seemed not to know fear and when it finally realized that it had been seen, it assumed an entirely different, threatening attitude and prepared to defend its nest with vigorous blows from its sharp bill.

A third species, the Cory least bittern, is practically identical with the common least bittern except that all



"BE IT EVER SO HUMBLE"

A Green Heron approaches its crude nest of sticks in the willows fringing a pond.

bird about the size of a crow and indeed at a distance, when on the wing, looks not very different, for, like other herons, it carries its head back on its shoulders and conceals its length of neck. It furthermore makes up for

its abbreviated tail by trailing its legs out behind. At close range, however, it is seen to be very different for, although it is not very green, it is certainly not black



A BITTERN ROOST

The Bittern pulls together the tops of the reeds with his long toes, gives them a twist and makes a comfortable bed on which to sleep above the water.

like a crow. Its crown and wings are greenish but its conspicuous neck and breast are largely chestnut and its back is bluish gray.

The little green heron differs from others of the true herons by leading a more solitary existence, seldom more than a single pair nesting in one clump of alders or willows. When frightened or upon taking wing, the green heron usually utters a rather harsh "skeow" and its vocal powers, even during the nesting season, are never much more musical.

The next best known species of heron is the great blue heron, in some districts misnamed the "crane." It is very much larger than the green heron, standing about

four feet high and having a wing expanse of about six feet, even greater than that of an eagle. Its general color is grayish, lighter on the head and neck, with a black belly and a black stripe through the head. It nests in colonies in the larger swamps, usually in the tops of the tallest trees, one tree often containing from five to ten nests. The tops of the trees are usually killed by the excrement of the birds but the herons continue to use the same trees as long as they will hold their nests. In some

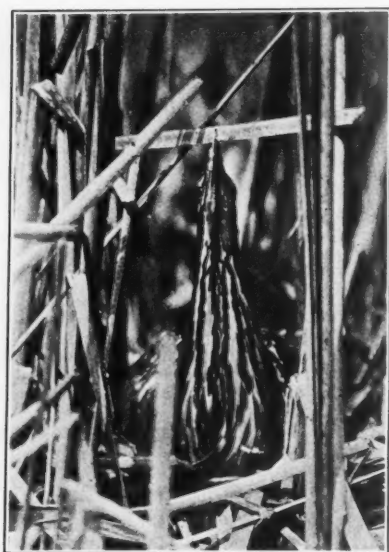
of the treeless regions of the west, the great blue herons nest on the ground in the marshes or in bushes on islands.

The herons are powerful flyers, traveling with measured beats of the wings and occasionally sailing so that they are able to feed many miles from their nesting grounds. When the young are ready to fly in late July or August, they scatter to all parts of the country wherever there is a good feeding ground. At such times they are unsuspecting and many are killed by the amateur marksman for, unfortunately, even in such progressive states as New York, they are not given protection by law. This is be-



LOOKS LIKE A BITTERN

But is an immature Black-Crowned Night Heron.



Photograph by Verdi Burtch

AN AMERICAN BITTERN "NOT AT HOME"

When she does not wish callers she assumes this position and usually goes unseen.



BIRD OR BROKEN REED?

The Least Bittern assumes this position when alarmed and usually escapes detection.

cause a few fishermen believe that they are destructive to trout when, as a matter of fact, trout form a very small part of the diet of a very few individuals and these could advantageously be dealt with in other ways than by removing protection from the entire species. Fortunately real sportsmen are as fond of the herons

ing out at dusk when their loud "quas" are familiar sounds in parts of the country where they are found. They nest in large colonies like the great blue herons but usually in smaller trees and sometimes in woods even at a distance from water.

The yellow-crowned night heron is a very different looking bird, confined to the marshes of the southern states and thence southward into the tropics. It nests in pairs along streams or associated with colonies of other herons.

One of the commonest herons of the southern states is the little blue heron which, because of the lack of ornamental plumes, has been allowed to survive even in large colonies. It is about the size of the little green heron and like it has a chestnut head and neck. The crown is the same color as the rest of the head, however, and the entire upper parts are dark slaty blue. The immature birds are pure white except for the tips of the wings and look very much like snowy egrets but, of course, do not have the ornamental plumes. Mottled individuals in the process of changing from white to blue are often seen.

A somewhat larger species but similar in color, except for the white on its under parts, is the Louisiana heron which in parts of Florida still occurs in rookeries containing thousands of birds. A still larger species and much rarer is the reddish egret which differs from both the little blue and

Louisiana herons in having a tuft of about thirty "aigrette" feathers growing from between the shoulders during the breeding season. It likewise has a white immature phase which was once thought to be a distinct species and called "Peale's heron."

The best "aigrette" plumes are found on the two white egret herons in which the "aigrettes," like the rest of the bird are snowy white. The larger egret approaches a great blue heron in size while the snowy egret is but little larger than the little green heron. Both species have about fifty straight plumes growing from be-



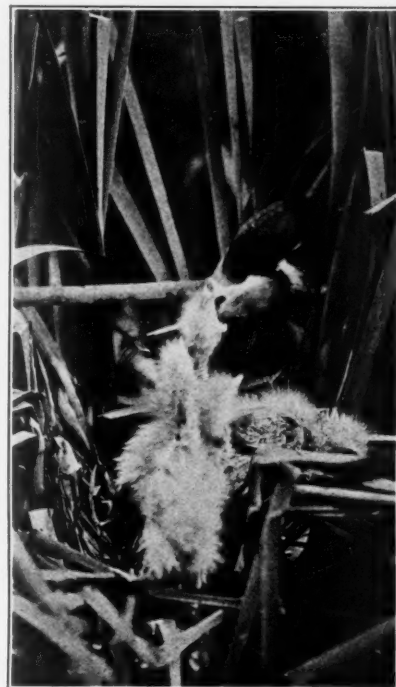
A NOVEL MARKET BASKET

The Least Bittern brings back the fish and frogs to its young in its throat and regurgitates them as shown in the next picture.

as they are of the fish and many an ardent disciple of Isaac Walton is willing to share even his trout stream with the herons for the sake of having them about.

The same may be said of the bitterns which are likewise denied protection. Occasionally an unfortunate bittern takes up its residence in a marsh bordering a trout stream and in his hunt for frogs and tadpoles may occasionally catch a trout fingerling. The vast majority of bitterns, however, live in the warm marshes where trout are never found and where they fall easy victims to the Sunday sports in their rowboats and the small boys with Flobert rifles hunting for the largest targets they can find.

The black-crowned night herons are about the size of the bittern and indeed the immature birds closely resemble them though the adults are entirely different, being nearly pure white or pearl gray in color with black crowns and mantles. They are nocturnal in their habits, usually roosting in trees during the day and com-



BREAKFAST A-LA-MODE (HERON)

The old bird turns its head on one side and the young grasps the base of its bill. Breakfast is served by vigorous pumping of the old bird's throat.

tween the shoulders and extending beyond the tail.

Forty or fifty years ago both species were common all through the south and especially in Florida but today they are the rarest of the herons. Were it not for the bird reservations and the non-sale of plumage laws, it



ONE OF THE RAREST OF NORTH AMERICAN BIRDS—THE CRY LEAST BITTERN

Many ornithologists believe it to be a color phase of the common least Bittern. Photograph of a wounded bird.

is probable that they would now be practically extinct. Twenty years ago every woman of fashion wore "aigrettes" in her hair or on her bonnet. Today, if she does so she will be arrested as it is against the law to have them in one's possession. Doubtless they will now go "out-of-style" though there are still a few foolish individuals who cling to their once valuable plumes in the hope that the laws will be repealed and that they will once more come into fashion; and this in spite of the fact that they know that each set of plumes means the death of a breeding bird and the starving of a nest full of young.

There is another white heron found in southern Florida called the great white heron. It is about the size of the great blue heron and has no plumes. There seems likewise to be an intermediate form between the Florida great blue or

Ward's heron, as it is called, and the great white heron. It resembles the Ward's heron but has a white head and neck. It has been called Wuerdeman's heron but its true status is not yet known.

In some parts of the country the herons are incorrectly called cranes, which, indeed, they resemble, the differences between them being more of anatomy than general appearance. In flight the herons always carry their heads back on their shoulders while the cranes carry



PRESENT BAYONETS

A Least Bittern defending its nest when it knows it has been discovered.

their necks fully extended. The herons bills are more or less angled while the cranes are rounded and the herons have all four toes well developed and on the same level while the cranes have the hind toe small and elevated. Cranes, moreover, are now rare in all parts of the country and have been practically exterminated in the east.

CARRIER pigeons will assist in protecting the forests of Oregon and Washington from fire, if experiments inaugurated in this district by Forest Examiner W. J. Sproat prove successful. Mr. Sproat has had some experience with the use of pigeons and believes they will be a valuable means of communication in emergencies and for carrying reports of fire and other

messages. The matter has aroused interest in the district office, and the birds will be tried out on several of the forests during the coming fire season. Mr. Sproat will take back to Bend with him five pairs of the birds for use on the Deschutes. Supervisor Sietz also plans to try them out on the Cascade.

SCOTCH LUMBER CUT BY NEW ENGLAND MILLS

The report of the operations in Scotland of the New England Saw Mill Units has been published by E. C. Hirst, State Forester of New Hampshire, who was in charge of the particularly interesting operations.

ABOUT a month after the United States entered the war the Massachusetts Committee on Public Safety learned that Great Britain was in distress for lack of skilled lumbermen and foresters to cut her timber. It was at once proposed that New England should raise, equip and send to England ten portable saw mill and logging units. The British gratefully accepted the offer, it was unofficially approved by Secretary of War Baker and receive the enthusiastic support of the Governors of the New England States.

To work out the details of the undertaking and to make its operation effective the Massachusetts Committee on Public Safety appointed a committee of which the chairman was W. R. Brown, of Berlin, New Hampshire, a director of the American Forestry Association and a member of the Lumber Committee of the Council of National Defense. The other members of the committee were: James J. Phelan, Vice-Chairman, Massachusetts Committee on Public Safety; Harold G. Philbrook, Treasurer, Vice-President, Connecticut Valley Lumber Company; F. W. Rane, Secretary, State Forester of Massachusetts; George S. Lewis, Treasurer, Connecticut Valley Lumber Company; Philip T. Dodge, International Paper Company; H. W. Blanchard, H. W. Blanchard Lumber Company; Garrett Schenck, Great Northern Paper Company; Hon. Herbert B. Moulton, Parker and Young Company; I. B. Hosford, St. Croix Paper Company; Martin A. Brown, Woodstock Lumber Company; George E. Henry, J. E. Henry and Sons; Samuel H. Boardman, President Eastern Shook and Wooden Box Association; J. M. Parker, St. John Lumber Company; Marshall T. Wood, Lande Manufacturing Company; H. B. Stebbins, H. B. Stebbins Lumber Company; Chester C. Whitney, Perry Whitney Lumber Company; J. H. Hustis, Receiver, Boston and Maine Railroad; L. S. Tainter, Conway Lumber Company; E. C. Hirst, New Hampshire State Forester; Forest H. Colby, Maine State Forester; W. O. Filley, Connecticut State Forester; J. B. Mowry, Rhode Island State Forester.

It is significant of the scope and influence of the American Forestry Association that of the 23 members of this committee twelve are members of the Association. This representation includes, in addition to Chairman Brown, Messrs. Philbrook, Rane, Dodge, Blanchard, Martin A. Brown, Henry, Tainter, Hirst, Colby, Filley and Mowry.

To send ten units for saw mill and logging operations in England involved the raising of a fund of \$120,000. The cost of each unit is placed at \$12,000. This money was provided over night. Through its Governor and its

committee on public safety each of the New England States subscribed the sum required for a single unit. With six units thus provided for, there was no difficulty in raising funds for the four remaining units by private subscription among the paper manufacturers, lumbermen and timberland owners of New England.

The following report on the work of the units is made by Manager Hirst:

The commercial timber in Scotland is in plantations on large estates. There is practically no natural growth. The plantations were set out partly to afford game cover and partly on account of the land owners interest in timber growing. For many decades prior to the present war there was little commercial incentive for planting anywhere in the United Kingdom. Cheap transportation permitted duty free lumber from Russia, Sweden, Norway, Germany and even America to be delivered to consuming centers in England and Scotland at such low prices that investments in home grown timber yielded a small and uncertain return. National emergencies have from time to time stimulated felling and planting. Thus, on a considerable part of the woodland operated by the New England Saw Mill Units the previous clear cutting furnished lumber for the Napoleonic Wars, and the trees planted soon after were of splendid size to furnish high grade dimension lumber during the last year.

The most important commercial trees in Scotland are Scotch pine, larch and Norway spruce. The first named is that planted in largest amount, the trade name for the lumber being "Scots Fir." In quality the lumber is about half way between our white pine and Norway pine. The larch is a native of the Austrian Tyrol and although planted for centuries in Britain, seed is still obtained from the native home of the tree on the continent. The larch furnishes excellent structural timbers, but is springy and more difficult to saw to accurate dimensions than the others. The Norway spruce is a rapid grower and much like our white spruce. It is planted only on moist ground.

The war found Great Britain in a serious situation in regard to timber for military purposes. Much greater supplies of timber were needed for war than had been anticipated and enemy submarine activities soon became a serious hindrance to securing timber from over seas on which the country had become accustomed to depend. It was necessary for the Government to organize a Timberland Supplies Department, and then immediately to requisition and purchase timber from private estates for the war industries of Britain as well as the large amounts which it became necessary to ship across the Channel for

military purposes in France. Military contingents from the Dominions over seas were required to carry on lumbering operations on a scale large enough to supply the war industries. It was to help out this serious situation that the New England Saw Mill Units were organized.

The small timber supplies of Great Britain have been very heavily depleted by the war cuttings and these conditions have awakened the country to the need of larger areas of forests. The Reconstruction Committee of Great Britain have recommended the establishment of a Forestry Department in the Government whose duty it shall be to support a public policy of timber growing, adequate for the country. This Department was established prior to the termination of hostilities.

The headquarters of the New England Saw Mill Units was at Ardgay, Ross-shire, Scotland, a village at Bonar Bridge Station on the Highland Railway, about fifty miles north of Inverness. A storehouse was built for the supplies needed for the mills and camp kitchens. Here the headquarters was located and the supplies for the men and horses were checked out to different units each week. All mills were located within five miles from headquarters, three operating on a timber tract purchased by the Government from Andrew Carnegie in Southland-shire and seven operating in a tract bought from Sir Charles Ross, in Ross-shire. These tracts were estimated to carry about 6,000,000 and 18,000,000 board feet respectively. The saw mill equipment arrived about the middle of July and lumber production got under way in August.

When manufacture first began in August the lumber produced was sent to port for shipment to France. Later in the fall specifications for France were cancelled and from then on practically all shipments were made for British war industries. About 60,000 railroad ties were railed from our loading bank at Bonar Bridge and a large amount of 3 and 4-inch dimension timber was made. A considerable part of the dimension timber was cut for special requirements. Very little lumber was wasted in the slabs, as round edge boards were taken off the outside edge of the logs when sawing dimension material. A great deal of pitwood was produced in the woods operations for use by the colliery companies. These were made from the tops and large limbs. This pitwood was graded into 3, 4, 5, and 6-inch diameter sizes, the length ranging from 6 to 14 feet. In cost accounting it is considered that one lineal foot of pitwood is equal to one board foot of manufactured lumber. The total production by the New England Saw Mill Units was 19,673,100 board feet of lumber and pitwood.

Sir John Stirling Maxwell, under whose direction the New England Units worked in, said of them: "The ten mills played a notable part in providing for Great Britain's timber needs. Their output man for man through the twelve months of your stay has been the highest that any operation under the charge of the Department can show. The type of mill you brought over, standing as it does midway between the large mills of the Canadians and the small mills of this country, has proved

admirably adapted to the timber you had to work and most economical of labor. While admitting the great benefit derived from the larger type of mill in providing the armies in France with quick supplies of trench timber and railway ties when speed was everything, most experts are agreed that the smaller type is likely to prove best in normal times in a country like this where the blocks to be felled are small and economy is the first object. Your mills represented a compromise between the two, singularly apt to the moment of your arrival. It would be easy to expatiate on the international value of your timely aid. It is on such acts that friendships are built. A gush of praise or gratitude can only spoil them and there has been nothing in the attitude of your colleagues or yourself to invite it. New England saw her help was needed and she gave it and we welcomed it. That is all. But you and I know that we have not worked together without losing some old prejudices for which newspapers, tourists and the too wide Atlantic are responsible, or without realizing how refreshing and fruitful the intercourse of friendly nations can be when they speak the same tongue and value the same things."

STATE Forester Alfred Gaskill, of New Jersey, has announced the purchase of 1,400 acres of timber land in Woodland township, Burlington County, by the State Department of Conservation and Development of New Jersey. This land increases the area of the Lebanon State Forest and joins several detached state-owned areas into a compact unit capable of more efficient management.

There are now six state forests in Burlington, Ocean and Sussex Counties, each under the charge of a resident forest ranger. The forests are being protected from fire and abuse, the production of timber is aided and encouraged, technical forestry studies and experiments of value are carried on, timber and wood products are sold when their removal is beneficial to the forests, and roads, trails and camp sites are developed for public use.

J. GERRY CURTIS, for some time past Assistant Forester of the city of Pittsburgh, has been appointed Forester and landscape engineer for the Carnegie Steel Corporation, in charge of the extensive work in planting, etc., now under way in connection with the construction of several hundred new homes for employees of the mills. A "home beautification" policy has been adopted and the streets are to be lined with shade trees, the front-yards dotted with flower beds and shrubbery masses, while fruit trees and berries are to be used extensively in the back-yards. The back-yard fences in the older settlements also are to be removed and hedges of barberry substituted. Back-yard garden clubs have been organized and prizes will be awarded each year for the best vegetable and flower gardens. The fact that special stress is to be laid on the training of the children in the care and protection of trees, shrubs and flowers plants promises well for the success of Mr. Curtis' plans.

EDITORIAL

WHY WE NEED MORE FOREST RESEARCH

ONE of the biggest economic problems before the United States is the production of wood to meet the future needs of our growing population and industries. No one at all familiar with present conditions can doubt that a very serious shortage of timber, with attendant high prices, hardship for consumers, and hindrance to the economic development of the country, will be upon us within a very few years unless vigorous action is taken immediately to insure continuous forest production on forest lands.

A movement, which has already a large measure of popular support, is under way to bring about this continuous production, not only from the public forests but also on the much greater area of privately owned forest land. But it must be borne in mind that the unanimous support of the public, of the law-making bodies, and of the forest owners themselves, will not suffice to insure the production of the right material in quantities sufficient to meet our future needs. Forest protection, conservative cutting, reforestation, restriction of cut to annual growth, will result in continuous crops of some kind of timber, but if undertaken in a haphazard way will not result in continuous crops large enough to meet even our present needs, nor is it at all certain that we shall have either the sizes, grades, or even the species of lumber which will be needed.

When good land is cheap, production and transportation costs low or nil, population sparse, there is little need for study of methods to increase food production, or of selection of varieties to plant. The Indian in the Tropics, who has only to go out and gather food which grew without any effort on his part, has no need to indulge in agricultural research. But with a highly developed civilization, with its ever-increasing population and resultant decrease in per capita area of agricultural soil, with increasing costs of production, and with the necessity of carrying the products of the soil long distances to the consumer, it becomes imperative to investigate methods by which a maximum amount of food can be produced, at the lowest practicable cost, on soils best adapted for each particular kind of crop. It is also necessary that the production of different kinds of foods bear some relation to the requirements of the consumers for the various products. It would not do to devote all agricultural land to the raising of cereals, for instance, even if it should be found that the maximum number of calories of food could be produced by doing so.

In forestry the same rule holds. The "timber-miner," who only harvests what Nature produced, and cares nothing for the future, has no use for forest research. But for a growing nation, whose forests under present methods are producing but a fraction of its needs, and even under the best methods that can be applied with our present knowledge will produce little more than enough for merely present needs, such research is of fundamental importance.

Foresters have yet barely scratched the surface in the study of American forests. It is not enough to know that certain methods of cutting in the Southern Appalachians, for instance, will be followed by reproduction, and that such reproduction will grow rapidly and produce valu-

able timber. It is necessary to know what method will produce the *most valuable timber*, or the timber which will best meet the national needs, and at the most reasonable cost; it is necessary to know just what species or mixture of species will succeed best under each given set of conditions; it is necessary to be able to say definitely in advance just what will be the yield of a given species managed in a given way on a specific tract of land, and what it will cost to produce it.

From the standpoint of the private owner it will not be enough to say that by adopting such and such a method he will make a profit; he wants to know how he can get the *largest possible* return from his investment in land, labor, and money. From the standpoint of the nation, it is not enough to know that certain methods will result in continuous forest production on forest soils; it is necessary to know which of several methods will best accomplish this result, and what methods will insure the proper proportion of different sizes and of different grades of material, and of different species.

We have reached a turning point in the development of forestry in this country. There are ample social, economic, production and growth data to clearly show the need for a change in our methods of handling our timber lands. No further data are necessary to prove to any intelligent observer of our forest conditions that unless our cut-over lands, unsuited for agriculture, are turned back into forest production, we shall in the near future be at a serious economic disadvantage.

Foresters have a sufficiently well worked out plan for remedial legislation, and enough of basic knowledge for formulating some simple silvicultural procedure by which to maintain continuous production in each forest region. But even as it is, if the forestry profession were confronted tomorrow with the responsibility for drawing up a plan of management for all the forest lands of the United States, it would be put to a severe test, just as was the case at that time of the placing of the National Forests under forest management.

The Forest Service found it necessary to establish eight or nine experiment stations to solve the technical problems that immediately arose in marking timber, in working out methods of brush disposal, methods to secure natural reproduction, methods of artificial reforestation, and similar problems. If the profession, therefore, is not to be content with merely securing some kind of growth on cut-over land, no matter how inferior it may be as compared with the original stand, but desires to be able to secure forest growth of the highest economic utility, it must set itself at once to the task of securing more fundamental facts upon which to base its practice on the vast area of privately-owned timber land.

The only way in which such data can be obtained is by long-continued, painstaking, scientific research. They cannot be obtained in a year or in a few years as in the case of agricultural investigations which deal with annual or biennial crops, but require long periods.

Is it not time that such research be started on a very much larger scale than has been undertaken hitherto, in order that when the mandate comes, we foresters shall not be found lacking?

SEAPLANES TO BE USED FOR FOREST FIRE PATROL WORK IN QUEBEC

BY ELLWOOD WILSON, EDITOR, CANADIAN DEPARTMENT

THE Province of Quebec has reason to be proud of itself. After many difficulties, which at many times seemed insurmountable, two seaplanes for use in forest fire patrol and mapping have been obtained and the first machine has been flown from Halifax, Nova Scotia, to Lac a la Tortue, a little village about two miles from Grand Mere, and is in actual use for patrol work. About three years ago the Directors of the St. Maurice Forest Protective Association discussed the practicability of using airplanes for patrolling, and a committee was named to look into the feasibility of the plan. They reported that it seemed practicable and in nineteen seventeen an effort was made to get a machine and pilot, without success. In nineteen eighteen another effort was made to put the scheme into practice. On Christmas Day, 1918, Mr. Allard, the Minister of Lands and Forests, sent for the writer and told him that he was much interested in the idea and would contribute \$2,000 toward an experiment. At the annual meeting of the St. Maurice Forest Protective Association a sum of ten thousand dollars was voted. The writer, after considerable study, decided that owing to the difficulty, amounting practically to an impossibility, of providing landing places for airplanes, that seaplanes were the only machines possible. It was learned that the Department of Naval Affairs of the Dominion Government had in storage at Halifax 12 seaplanes turned over to it by the American Navy at the signing of the armistice. The Department was asked, through the Acting Minister, Hon. A. K. McLean, to loan two of these machines. After much consideration and discussion he agreed to loan them and an agreement was entered into to take over these machines. The Minister of Marine, the Hon. C. C. Ballantyne, who had been absent in California on account of serious illness, returned to Ottawa and at once decided that he would not loan the machines, and he said that proper safeguards for their return to his Department had not been put in the agreement. However, after a long discussion of the matter, he finally consented to allow the machines to be loaned on the original agreement. Much credit is due to the two gentlemen named above for their action in making possible this experiment. The Montreal Branch of the Aerial League of Canada also co-operated in helping to get these machines, by sending a deputation to Ottawa to see the Minister, and by many helpful suggestions. The President, Sir Charles Davidson, gave much needed legal advice and helped in other ways.

The pilot engaged by the Association, Lieut. Stuart Graham, of Montreal, had

had experience with both airplanes and seaplanes, having served in the Royal British Naval Air Service and having been decorated for sinking a German submarine after his engine had gone dead. He went to Halifax and with his engineer, Mr. Kehre, and with the help of the officers of the Halifax Station, assembled seaplane No. 1876. He left Halifax on the afternoon of June 5 and flew to St. John, New Brunswick, without any trouble except a fog which lifted just as he reached St. John. He remained there over night and left the next day for Lac Temiscouata, Quebec. In flying across the State of Maine, he encountered a heavy thunderstorm and seeing a lake of the same shape as the one he was looking for made a landing, only to find that he was on Eagle Lake, Maine. He remained there over night and flew to Lake Temiscouata the next morning. He had ordered gas and oil sent there but it had not arrived so he was forced to take automobile gasoline and go on to Riviere du Loup on the St. Maurice. On the morning of the 8th of June, the sea water was very rough and a high wind and strong tide, and in trying to take off the nose of the machine went entirely under water drenching Mrs. Graham, who was in the forward seat acting as navigator. He left Riviere du Loup at 1 P. M. passed over Quebec City at 2.25 and arrived at Three Rivers at 3.10. Here he was met by Messrs. R. F. Grant, President, and Mr. Henry Sorgius, Manager, and Ellwood Wilson, a Director of the St. Maurice Association. At the wharf the Hon. J. A. Tessier, Minister of Roads and Mayor of the City of Three Rivers, formally welcomed Lieut. and Mrs. Graham, the Mayoress presenting Mrs. Graham with a bouquet of beautiful flowers. After a rest the party took the air at 6.50 and arrived at Lac la Tortue at 7.10. The trip was made without incident or mishap of any kind, the four hundred horse power Liberty engine never missing a stroke. The plane seems to be ideal for work over forests such as those in Quebec where lakes for landing abound. Its gasoline capacity is a little low for long flights. The machine lands and takes off beautifully. Mrs. Graham has named the first machine "La Vigilance." Lieut. Graham leaves the 11th of June for Halifax to bring up the second machine and will then commence his patrol and photographic work. Complete cost records are being kept and will be published at the end of the season.

This is the first use of seaplanes in Canada for other than war purposes, the first flight of any kind ever made from Halifax to Quebec, and I think the first for commercial purposes ever made in Can-

FORESTERS ATTENTION

AMERICAN FORESTRY will gladly print free of charge in this column advertisements of foresters, lumbermen and woodsmen, discharged or about to be discharged from military service, who want positions, or of persons having employment to offer such foresters, lumbermen or woodsmen.

ARBORICULTURIST is open to an engagement to take charge of, or as assistant in City Forestry work. Experience and training, ten years, covering the entire arboricultural field—from planting to expert tree surgery—including nursery practice, and supervision in the care and detailed management of city shade trees. For further information, address Box 700, care of American Forestry.

POSITION wanted by technically trained Forester. Have had fourteen years experience along forestry lines, over five years on the National Forests in timber sale, silvicultural and administrative work; three years experience in city forestry, tree surgery and landscape work. Forester for the North Shore Park District of Chicago. City forestry and landscape work preferred, but will be glad to consider other lines. Can furnish the best of reference. Address Box 600, Care American Forestry Magazine, Washington, D. C. (1-3)

YOUNG MAN recently discharged from the U. S. Navy, wants employment with wholesale lumber manufacturer; college graduate; five year's experience in nursery business; can furnish best of references. Address Box 675, Care American Forestry Magazine, Washington, D. C. (1-3)

WANTED: Young forester, preferably married, for clearing and maintaining woodland on small estate, operating private nursery, etc. Will pay \$80 or better, depending on qualifications and experience. Six room residence on state road included. Address Box 750, c/o American Forestry Magazine, Washington, D. C. (7-9 19)

ada. The Managers of the various Companies which make up the St. Maurice Forest Protective Association have signified their intention to inspect their timber limits from the air, and photographic maps will be made for any timber holders in the Association who wish them.

A small station with living quarters and machine shop is to be prepared for the machines and the fullest possible use will be made of them.

VALUE OF NUTS

Nuts can and do take the place of meat in the diet with beneficial results, and with the growing scarcity of meat due to the world war, they are bound to be in great demand at good prices in the future.

The comparative food value to the pound in calories is shown by the following table:

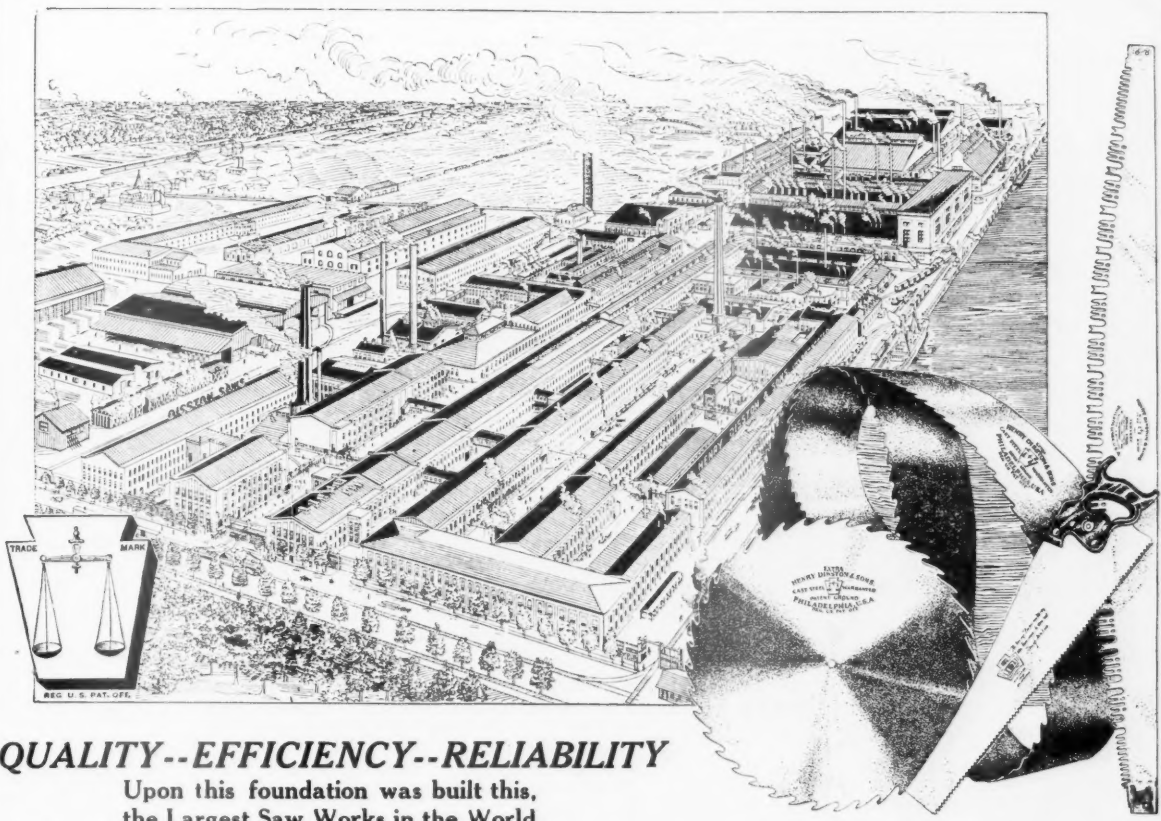
Round Steak	950
Wheat Flour	1,650
White Bread	1,215
Dried Beans	1,605
Raisins	1,605
English Walnuts	3,075
Pecans	3,445

It should be noted here that the true value of any article of food should not be measured by its cost, but by what it is worth to the consumer.

ONE POPLAR BRINGS \$11,000

A yellow poplar tree of giant size, which for years had stood in the hills of the Cumberland Mountain, where it was an object of unusual interest, has already brought approximately \$11,000 as a manufactured product. The tree was cut down by a local lumber concern and consigned to a firm in Cincinnati. When sawn, the product totaled nearly 7,000 feet of first-class lumber, with several hundred feet second-class lumber thrown in.

It is declared that this was the largest tree marketed from the eastern Kentucky fields within a half century. It was so large that for a number of years the task of marketing it was a serious obstacle, there being few lumbermen who cared to try to cut it down.



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HELP TO REFOREST FRANCE

THE AMERICAN FORESTRY ASSOCIATION has undertaken the great task of helping to reforest the shell-torn, war-shattered areas of France; and to aid also Great Britain, half of whose forests were felled; Belgium, whose forests suffered terribly, and Italy.

The great humanitarian need, the prime economic importance, the broad constructive value of this work—all place it on a plane which gives it striking pre-eminence. Therefore, it is felt that every member of the American Forestry Association will desire to have a part, and as big a part as possible, in carrying out this program.

BY those who are competent to judge, it is asserted that the forests of France kept the Germans from Paris. How great a debt, then, does the world owe to them!

AMERICA can build no nobler memorial in Europe than by replacing the devastated forests of France, Great Britain, Belgium and Italy. ¶Answer this appeal at once by sending your check for whatever amount you can afford, to the American Forestry Association. It will help to purchase the seed needed to replant the forests of our Allies.

Checks Should Be Sent to

THE AMERICAN FORESTRY ASSOCIATION
WASHINGTON, D. C.

BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.

FOREST VALUATION—Filbert Roth.....	\$1.50
FOREST REGULATION—Filbert Roth.....	2.00
PRACTICAL TREE REPAIR—By Elbert Peets.....	2.00
THE LUMBER INDUSTRY—By R. S. Kellogg.....	1.10
LUMBER MANUFACTURING ACCOUNTS—By Arthur F. Jones.....	2.10
FOREST VALUATION—By H. H. Chapman.....	2.00
CHINESE FOREST TREES AND TIMBER SUPPLY—By Norman Shaw.....	2.50
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LUMBER AND ITS USES—R. S. Kellogg.....	1.15
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THE TREE GUIDE—By Julia Ellen Rogers.....	2.12
MANUAL FOR NORTHERN WOODSMEN—Austin Cary.....	.57
FARM FORESTRY—Alfred Akerman.....	2.10
THE THEORY AND PRACTICE OF WORKING PLANS (in forest organization)—A. B. Recknagel.....	2.20
ELEMENTS OF FORESTRY—F. F. Moon and N. C. Brown.....	1.75
MECHANICAL PROPERTIES OF WOOD—Samuel J. Record.....	1.75
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* This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—EDITOR.

TREES OF INDIANA

A new book of 300 pages on "The Trees of Indiana" has just been issued by the Department of Conservation of the State of Indiana. It contains a scientific description and a full-page illustration of each of the native trees of Indiana. The qualities and uses of the wood are given and the value of each species for shade and for forest planting is discussed. This is a book that should be in the hands of every wood lot owner and of everyone

who is interested in our native trees. It is especially recommended for teachers. It will enable them to teach their pupils to know our native trees. Any teacher can have as many copies as he can use to advantage in his school work. This book is free for the asking, but since the supply is limited, if a copy is desired application should be made at once. Send your order to the Department of Conservation, office of the State Forester, Indianapolis, Indiana.

BOOK REVIEWS

The Forest Ranger, by John D. Guthrie. Richard G. Badger, the Gorham Press, Boston, Mass. Price, \$1.50. This is a book of verses, collected and edited by John Guthrie, which he has been getting together for the past fifteen years. Many of them appeared originally in the pages of forest news letters issued on the different National Forests. Poetical or literary merit is claimed only for a few but they surely reflect the daily life and work of the Forest Ranger in the wide and beautiful forest lands of the West. Some are frankly parodies, some rhymes and jingles and a few are songs most familiar to the ranger and hummed around his lonely camp fire on the trail. The desire of the editor to bring together and put on record a true expression of the spirit of these men who have heard the "call of the forest and of the distant places" is well met by the little volume. The book is prefaced by a characteristic letter from Gifford Pinchot, in which he says to the editor: "In collecting these verses, you have put me, with every other Forest Service man, deeply in your debt." Mr. Guthrie's work was a labor of love and we predict for it a warm welcome, worthy of the spirit of its preparation.

Practical Tree Repair, by Elbert Peets, 259 pp., il., \$2.00. Robt. N. McBride & Company, New York.

No science is more firmly founded on known facts and methods than that of tree repair and the prevention of tree diseases. The author of this intensely practical book gives clearly and concisely complete instruction covering the treatment of wounds, rot-fungi, boring insects, filling of cavities, bracing, materials used in filling, treatment of cavities without filling, etc. Illustrated from photographs and diagrams, this book is useful alike to the owner of a home and to the man who intends to take up tree repair work.

Identification of the Economic Woods of the United States, by S. J. Record, \$1.75. Revised and enlarged second edition, John Wiley & Sons, Inc., New York.

The main differences between this edition and the first (1912) are as follows: (1) The Key has been entirely rewritten and rearranged, several new woods are included and more of the common names are given; (2) the lists of references and the general bibliography have been brought up to date; (3) an Appendix has been added which amplifies some of the subject matter of Part I, and also includes considerable new data on wood structure.

In grouping the woods in the Key more attention has been given to their general similarity than to special features, thus bringing together for effective contrast the kinds which are most likely to be confused in practice. Attempt has been made to

have all of the descriptions comparable and, so far as permissible to make the gross characters the basis for separation. The microscopic features are printed in smaller type than the others, to avoid confusion and to simplify the use of the Key.

It is comparatively easy to make a key for a given lot of wood specimens, but to take into account the range of variation of each wood is an extremely difficult task. Such a key must be the result of growth, of the accumulation of years of investigation and experience, and must always be subject to revision as new data and new material become available. To this end the author enlists the co-operation of all readers of this magazine.

Vacation Days in Colorado's National Forests. Issued by the Office of the District Forester, District 2, this recreation booklet is guaranteed to create a longing in the heart of every reader for "the hills, whence cometh our help." And nowhere in our wide and beautiful country is this desire more fully met than in the "Switzerland of America." The National Forests in Colorado hold an opportunity, and an invitation to those to whom the impulse comes to leave the heat of the city and business cares behind and follow the open road to the "still places." Nowhere else in the United States, and seldom in any land, may one look upon more majestic vistas of snow-capped mountain ranges, forested slopes, granite gorges, tumbling cascades and rolling plains than in these playgrounds of the people in Colorado. The climate is wonderful—a tonic of sunshine and pure air, filling one with vigor. Few places may be found which offer the seeker after rest, recreation and outdoor life so many opportunities for enjoyment. The booklet describes briefly the National Forests within the boundary of Colorado, stressing particularly points of interest and the privileges extended to prospective visitors and contains as well practical advice and information regarding camping outfits, personal equipment necessary, etc. Further information may be had by addressing District Forester, District 2, New Federal Building, Denver, Colorado.

ENTOMOLOGISTS of the United States Department of Agriculture who last fall began an examination of the cranberry bogs of Michigan, Wisconsin, and the Pacific Coast which have received shipments of cranberry vines from New England report that they find no evidence of gypsy-moth infestations from such shipments. It had been feared that the moth had been carried on the vines to the western bogs. Determination of the fact was necessary in order to know what control measures should be undertaken. In that connection the Department is making tests to determine both the resistance of cranberry vines to intensive fumigation and the strength of fumigation necessary to destroy the eggs of the gypsy moth.

CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF
FOREST ENGINEERS

The Laurentide Company, which was the pioneer in grinding hardwood for pulp in an experiment last fall, tried a further one this spring when seventy cords of mixed birch, beech and maple was barked in the drum barkers without any difficulty and ground into pulp. Owing to the irregularity of the four foot sticks barking with knife barkers was soon proved to be unsuccessful but the drum barkers removed the bark, if anything, a little more easily from the hardwood than from spruce, the only difficulty was the weight of the wood which is harder on the conveyors. Beginning in August the Company will begin to use hardwood continuously.

The meeting of the Woodlands Section of the Canadian Pulp and Paper Association took place on June 25 and 26. The first day was spent at the Berthier Nursery of the Provincial Government as the guests of Mr. Piche, Chief Forester. The Minister of Lands formally opened the air patrol and the seaplane arrived and left from Berthier for its first trip. The nursery was inspected and also the planting on drifting sands at Berthier and a fine stand of white pine which has been thinned and cared for for a number of years. There was also a general discussion of reforestation and slash disposal. The meeting on the next day was held at Grand Mere and Proulx where the nurseries and experimental plantations were inspected and where tractors were shown at work and a kerosene brush burner and gasoline fire pump demonstrated. An out door woodsman's lunch was served. A representative of the U. S. Forest Service was present and a large number of representative pulp and paper and lumbermen were present with a number of Government and private Canadian foresters.

Two trees affected with blister rust have been found in a plantation of Scotch pine planted by the Laurentide Company and have been removed and burned. The white pine weevil has also attacked the same plantation and a fungous disease which has destroyed some of the terminal buds. This latter is now over. If Scotch pine is going to suffer in this way it will hardly pay to plant it in this section.

Mr. H. G. Schanche, for many years with the Forestry Division of the Laurentide Company has become forester for the Abitibi Pulp and Paper Company, Ltd., of Iriquois Falls. They expect to start a nursery at once and begin reforestation on their cut-over lands.



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In the St. Maurice Valley two large fires have been extinguished without loss of merchantable timber but with a large area of cut-over land destroyed. In the earlier days when the areas of timber cut over each year by the various operators were small and widely separated the danger from the heaped up debris was not serious. Today, however, when an area of 126 square miles is being cut each year and when the operations of some of the companies are contiguous, a dry spell of eight or ten days and a high wind make such areas almost impossible to control and a terrible conflagration will be almost inevitable. The large number of men required to fight such fires makes them very expensive. The time has come when some Province-wide system of burning slash from lumbering must be inaugurated. Even if the cost should run to a dollar a cord, by being borne equally by all no hardship would be incurred and the cost would



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be borne by the consumers at large who are the real owners of the forests and who are most interested in their protection. Individual timber holders can cut off their timber, make a profit and go out of business, but the public cannot see their forests vanish. Wood we must have and the forests must be handled so as to perpetuate them.

The Province of Nova Scotia has decided to employ a Provincial Forester and thus complete the proper policy for the whole of the forested provinces of the Dominion.

The work of the Dominion Forestry Branch at the Petawawa Forest Reserve, under Mr. H. C. Wallin, in studying the growth, increment and so forth of the trees there will continue during the summer. Some valuable results were obtained last year and much is hoped from the research program now under way.

The Commission of Conservation in co-operation with the Laurentide Company, the Riordon Company, the Abitibi Company, the Province of New Brunswick and the Province of Quebec, will continue their research work under Dr. Howe into the growth, reproduction, mortality rate, etc., on cut-over pulpwood lands. The work will also be extended to burnt over country. Plots have been laid out and treated in various ways. For instance, one plot has been cut clean and the debris burned in piles, another cut-over and the debris allowed to lie and the hardwood trees have been girdled. On others every seedling is

tagged and numbered and the growth will be studied. An entomologist and an expert in fungous diseases are with the party and will look after their respective fields. At the Laurentide Company plantations of various trees on different soils and with different aspects have been made, also different mixtures of trees and mixtures of dominant and suppressed trees from the transplant beds. These will be measured and studied from year to year. Seed selection is also being practiced and Scotch pine of the second generation is already growing.

A DEPARTMENT OF FOREST RECREATION ESTABLISHED AT THE NEW YORK STATE COLLEGE OF FORESTRY

A NEW department, that of forest recreation, has just been established at the New York State College of Forestry. This department will assist in the development of the work of the College, both along investigational and instructional lines, in the proper uses of forest areas for public recreation purposes. The establishment of this department is in line with the endeavor of the College to make its work of real service to the people of the State and to increase the right use of forests and forest lands. This is the first department of forest recreation to be established in a school or college in this country.

With the great Adirondack and Catskill Forest Preserves, Palisades Interstate Park, Letchworth Park and some thirty other public forest reservations, the whole totaling nearly two million acres, New York State has unique forest resources, capable of securing to its millions of people great public good in the way of recreational uses. Just as playgrounds are being established in villages and cities throughout the country, where play may be organized and properly directed, so the forests of this and other States must be studied and developed, that they may be more effective playgrounds for the people of the State.

This new department of forest recreation in the College of Forestry will be in charge of Prof. Henry R. Francis, who has made a specialty of this line of work and who during the past five years has been carrying on landscape extension work both in New York and Massachusetts. During the coming summer Professor Francis will begin systematic studies of forest and park areas in New York to prepare bulletins for recreational development, and late in the season will make a trip through the national forests and national parks of the West to see what has already been done by the National Government and by the Western States in developing the recreational possibilities of forest lands.

PROTECT LOCUST TREES FROM BORERS

PLANTATIONS of the locust tree can be successfully protected from the borer and grown profitably on a commercial scale if the trees are planted in thick stands or mixed with other trees, so as to produce a densely shaded condition during the first ten to fifteen years. Investigations of the United States Department of Agriculture showed that more trees were destroyed by borers in tracts which had been pruned occasionally, or closely grazed, or in which fire had killed out the underbrush, thus destroying the natural shade produced by weeds and shrubbery.

The denser the underbrush about the trunks of the trees the less is the damage done by borers. Trees growing from two to three feet apart were seldom injured, while nearby isolated trees were riddled by borers.

Condition Necessary for Borer Attack

All trees and all parts of the tree are not subject in the same degree to attack by the borer. Rough bark provides crevices in which the borers deposit their eggs. Young trees, less than one and one-half to two inches at the base, are not attacked unless the bark is rough. On younger trees the borers are found at the base and near rough crotches. Trees with trunks more than five or six inches in diameter rarely contain the insects. On such trees the larger branches frequently are infested, but such injury is seldom common enough to do much harm. Protection from borers is necessary for only a comparatively short period during the tree's growth. Under good growing conditions this time should not exceed ten years.

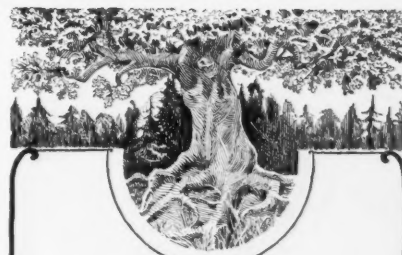
Treatment of Shade Trees

The locust is widely planted for ornamental and shade purposes. It is highly desirable, because it grows readily in a variety of soils and situations. It grows rapidly and forms a shapely crown when planted in the open. But it is frequently attacked by borers. This is because shade trees are planted singly and in the open, thus furnishing favorable conditions for attack.

Young borers can be killed readily by the use of an arsenical spray. Spraying will be necessary only every two or three years, unless badly infested trees nearby are not treated. As a rule, spraying will not be needed after trees reach six inches in diameter. Trees of that size are usually immune from attack, but should be watched.

Locusts make such desirable shade trees that they should not be neglected and allowed to become injured or destroyed by borers. The increasing value of black or yellow locust for many purposes makes it a profitable tree to grow commercially and emphasizes the importance of protecting it from the borer. Information concerning the care of both shade trees and commercial plantings of locust is included in Bulletin 787, issued by the United States Department of Agriculture, Washington, D. C.

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AIRPLANE PATROL IN NATIONAL FORESTS

PATROL of national forests by Army airplanes to give early warning of fires developing in the forests began June 1, according to arrangements completed with the War Department by the Forest Service, United States Department of Agriculture. On the same day observations covering a large part of the Angeles National Forest were begun from a captive balloon stationed over the Army Balloon School near Arcadia, California.

Two routes of airplane patrol work will be operated from March Field, twelve miles southeast of Riverside, California. Two planes will be used on each route, the routes will each be approximately 100 miles long and each route will be covered twice a day.

This is the beginning of experimental work in which the adaptability of aircraft to forest patrol work is to be thoroughly tried out. If the tests prove successful it is expected that the airplane patrols will be extended before the end of the 1919 season, and that airplanes will become a permanent feature of the ceaseless battle against fires in the national forests.

The airplane routes from March Field will afford an opportunity to survey about 2,000 square miles in the Angeles and Cleveland National Forests. The airplanes are not equipped with wireless telephone apparatus of such a nature that they can communicate with the ground without the installation of expensive ground instruments. Warnings of fires will be transmitted by means of parachute messages dropped over a town, the finder to telephone them to the Forest Service; by special landings made to report by telephone, and by returning to the base and reporting from March Field direct to the forest supervisor. Fires will be located and reported by squares drawn on duplicate maps, one to be in the possession of each airplane observer and another to be in the office of the forest supervisor.

The observation balloon over the Arcadia Field is to be maintained at an elevation of about 3,000 feet from 7 A. M. until 2.30 P. M. each day. The student detachment learning observation now stationed at Mount Wilson will also render fire lookout service. Reports of fires from both the balloon observer and the Mount Wilson detachment will be telephoned to the Army Balloon School and transmitted to the Forest Service office at Los Angeles. A fire-fighting truck, with ten enlisted men, will be stationed at Arcadia as part of the fire-suppression forces and will be subject to the call of the Forest Service.

IN MANY sections of the national forests it has been found impossible, without great expense, to maintain telephone wires or cables because of the havoc wrought by timber falling across the wires and by heavy snowslides. Therefore, wireless tele-

phones are soon to be given a trial in the forests, and the Signal Corps of the Army has lent four combination sets of transmitting and receiving apparatus to the Forest Service of the United States Department of Agriculture.

Equipment is to be installed on Mount Hood, at an elevation of about 13,000 feet, and another set is to be at the nearest forest ranger station, about twelve miles away. Two other sets are to be placed in the Clearwater forest region of Idaho, which is heavy wilderness country.

Wireless telephones have never been tried in mountainous country, and interest centers in the results of the experiments, particularly in the effect on messages of high ridges between telephone stations. The Mount Hood experiment will show the practicability of talking from a high point to a low point, and the Clearwater forest experiment will demonstrate whether messages can be communicated from two points of about the same elevation but separated by mountains.

All the wireless stations will be established at lookout points, and will give warnings of fires developing in the forests, supplementing the regular facilities of the Forest Service.

A CREW of treeplanters at Albuquerque, New Mexico, is now working under the direction of the Forest Service planting Douglas fir and Engelmann spruce on the high, barren slopes of Santa Fe Baldy, in the Sangre de Cristo range, on the Santa Fe National Forest. A large number of trees were planted last year, and 40,000 more are now being planted.

These seedling trees were grown from the seed of native forest trees at the Gallinas forest nursery, where experiments have been conducted for several years by the Forest Service in the art of growing forest trees from seeds. The problem is a very difficult one, according to forest officials, owing to the many technical questions involved in the semi-domestication of wild tree species. These problems have now been solved, and the forest plantation on Santa Fe Baldy, as well as several other plantations in the region, have been successful, and conclusively prove that forest trees can be artificially grown in the southwest in spite of adverse climatic conditions.

After getting a three years' growth in the Gallinas nursery, forty thousand of the seedlings were transported on pack-horses, with great difficulty, nearly to the summit of Baldy early this spring, where they were buried in the snow until weather conditions became favorable for planting. With the unusually moist, cool season, forest officers are very hopeful that a large percentage of the seedlings will survive and grow into a heavy stand of valuable timber in the course of the next two centuries.

The work of growing the seedlings and starting the plantation has been carried out by Forest Examiner Herman Krauch.

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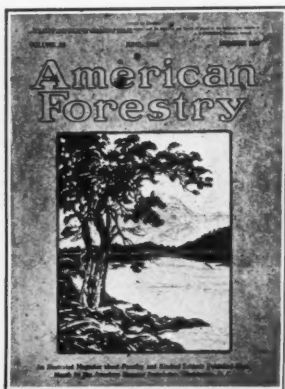
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